Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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- Consumer-Testing Methods, P. 7
- Plastic Fish Container, P. 11
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— and 36 others

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Commercial Fisheries Abstracts

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In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
3	Preserved fish	8	Composition
4	Oils	9	Miscellaneous

Issued with the approval of the Bureau of the Budget, December 29, 1953

3.23 DEVILED CRABS: 25,000 DAILY

Anonymous
Food Engineering 26, No. 11, 99, 176 (November 1954)

A Philadelphia processor of specialty foods is now marketing a 6-ounce package containing frozen deviled crabs that need only to be heated and served. There is no waste because the crab is prepared in edible pastry shells that conform to the shape of a natural crab shell. The company is now producing 25,000 packages of crab daily.

Manufacturing of the deviled crab is a 6-stage process: a cream sauce is prepared in a stainless-steel steam-jacketed kettle. The sauce is seasoned and combined with other ingredients including crab meat in a horizontal batch-type mixer. The deviled crab mix is then placed in the hopper of a patty-forming machine that extrudes the mix in the form of crab-shaped patties.

These patties are placed on edible pastry shells and dipped into an egg-batter from which they are removed by a wire mesh belt. Excess batter is allowed to drain away before the patties on the shell are discharged onto a wooden tray containing bread crumbs.

The breaded crabs on trays are then cooked for several minutes in a batch-type deep-fat fryer containing hydrogenated vegetable oil at 375° F. Excess cooking fat is allowed to drain away from the cooked crabs and back into the fryer. The cooked crabs on trays are then loaded onto racks and pre-chilled at 25° F. After being chilled the crabs are air-blast frozen at -30° F. for at least 30 minutes.

(over)

 ABSTRACTER: Martin Heerdt

3.238 FROZEN FOOD CONTAINERS

Shelor, Ethyl and Woodroof, J. G. (Georgia Experiment Station, Experiment, Georgia)
Food Technology 8, No. 11, 490-497 (November 1954)

The leading types of frozen-food containers are (1) hermetically sealed tin cans for concentrated juices and fruits in syrup; (2) semirigid-type cartons with moisture-vapor-proof overwrap, for most commercially packed fruits and vegetables; (3) aluminum foil; (4) nonrigid bags that can be packed under vacuum and heat shrunk, for irregular shaped items; (5) aluminum-foil dishes with crimped foil covers, for precooked products that require heating before being served; and (6) rigid, leakproof, reusable containers, primarily for home use.

In addition to protecting the product against mechanical damage, leakage, desiccation, and excessive oxidation, a suitable package must be easy to fabricate, to fill and close in a production line, and to stack, handle, and open. A package should also be inexpensive, easily obtainable, easily labeled, and have qualities that permit rapid freezing.

Frozen-food containers may be classified as rigid containers, semirigid containers, nonrigid containers, wrappers, glazes, and dip coatings.

Rigid containers include the following: tin cans; paper cans, tumblers and tubs; glass containers; plastic containers; aluminum trays and cans; and wooden barrels.

Semirigid containers include a variety of rectangular paperboard cartons, aluminum-foil containers, and fiber plates.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

3.17 STUDIES ON THE PRESERVATION OF FISH BY MEANS OF ICE WITH BACTERICIDAL ADDITIVES

Partmann, W.
Kaltetech. 4, 192-197 (1952)
Food Science Abstracts 26, No. 5, 507 (September 1954)

Experiments were carried out with freshwater fish (bream, and also roach, tench, or perch), which were gutted, and seldom weighed more than 200 g.; results obtained do not apply directly to sea-water fish, owing to considerable differences in the microflora, tonicity, ratio of weight to surface, etc. Pieces of ice about 2 cm. long were placed in 5-l. jars; the fish were laid in the ice in such a way that they did not touch either each other or the sides of the jar. After storage for 14 days at 2° C., the fish were examined; they were then laid in fresh ice, as before, and stored for a further period of 16 days. The effects of adding the following substances to the ice were examined: 0.05% sulphacetamide, 0.02% Irgafen sodium (sodium dimethylbenzoylsulphanilamide), 0.02% Irgamide sodium (sodium dimethylacroylsulphanilamide), 0.15% hydrogen peroxide, and mixtures of Irgafen sodium or Irgamide sodium with peroxide; these particular sulphonamides were selected because their solutions are only faintly alkaline. In further experiments, formic acid, lactic acid, and trypaflavine, and sodium nitrite (alone or with common salt), sulphathiazole, Halazone, Quartamon, and Zephyrol were tested. The quality of the fish was evaluated subjectively (by odour and appearance) and objectively (by analysis). Relatively satisfactory results were obtained with 0.02% sodium nitrite +1.5% sodium chloride, 0.005% trypaflavine + 0.01% formic acid, 0.01% trypaflavine alone, 0.01% Irgafen sodium + 0.01% formic acid + 0.15% peroxide, 0.02% Irgafen sodium + 0.05% formic acid, 0.05% Irgamide sodium + 0.08% sulphathiazole, and 0.05% sodium nitrite.

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3.240 QUALITY OF SEA-FROZEN COD

Banks, A.
Food Manufacture 29, No. 11, 435-436 (November 1954)

Empirical tests were used by the author to determine the effects of different pre-freezing treatments and different storage temperatures on the quality of cod frozen at sea. The frozen cod was evaluated primarily on (1) appearance of the thawed fish, (2) texture, (3) flavor, and (4) suitability for smoke-curing.

The tests showed a necessity for storage at -30° C. if cod frozen at sea is to compete with good quality iced cod. Fresh cod may be held in ice for a few days prior to being frozen if the frozen cod is stored at -30° C. However, normal care in gutting and icing must be given to cod that are frozen at sea.

Fish that are frozen prior to entering rigor mortis may show some abnormal qualities when they are thawed and examined. Under normal operation, however, the fish are held in ice for 1 or 2 days prior to being frozen. Consequently pre-rigor fish are not likely to be encountered, and no precautions need be taken to avoid freezing them. Three days is the maximum period that fish to be frozen at sea may be held in ice prior to freezing if undesirable variations in quality are to be avoided.

Consumer reactions indicate that fishery products frozen at sea under the right conditions are highly acceptable.

 ABSTRACTER: Martin Heerdt

3.17

MODEL EXPERIMENTS ON THE ACTION OF CERTAIN BACTERICIDAL SUBSTANCES FOR THE ICING OF FISH

Partmann, W.
Kaltetech. 6, 66-68 (1954)
Food Science Abstracts 26, No. 5, 507 (September 1954)

Aqueous suspensions (15:100) of minced fish (cod and tench) flesh were used for the study of the bactericidal activity of substances such as Salthion (as the liquid and as the calcium salt), anti-autolysin, formaldehyde, and sodium nitrite. Basic nitrogen and tyrosine nitrogen were determined. The length of storage was 13 to 20 days for tench and 10 to 12 days for cod muscle, at 1°C. The best results were obtained with 0.01% formaldehyde, the poorest with 0.05% anti-autolysin.

3.240 (Cross Reference: 1.50)

3.23

Two 3-ounce frozen deviled crabs are packed in each laminated carton. These cartons are machine wrapped, heat sealed in wax paper, packed into shipping cases, and placed in frozen storage.

This same company also manufactures frozen deviled lobster, deviled clams, salmon croquettes, chicken croquettes, breaded oysters, and a variety of bite-size seafoods. The most popular item in the bite-size line is the crabette, a bite-size deviled crab.

3.238

Nonrigid containers consist of bags made of various materials including Cry-O-Rap, rubber hydrochloride (pliofilm), polyvinylidene chloride (Saran), polyvinal chloride (Visten), and plain polyethylene. All of these materials are transparent, elastic, and flexible at all temperatures and can be heat-sealed.

Wrapping materials include aluminum foil, moisture- and water-resistant cellophanes, waxed or paraffined papers, polyethylene film, polyvinylidene chloride (Saran), Cry-O-Rap, rubber hydrochloride, and laminations of these materials.

Glazing consists of dipping frozen products into cold water to produce a uniform ice glaze. This method has been used extensively in the past for protecting fish, shrimp, and whole fresh hams and other pork cuts, but is steadily being replaced by bags, wraps, and cartons.

Dip coating involves coating the frozen product by dipping it in a molten thermoplastic mixture. Upon coming in contact with the cold surface of the commodity, the dip coating solidifies and forms a continuous protective film, thus supplying a barrier that protects the product against contact with air and prevents loss of water vapor. Frozen foods packaged in this manner retain quality for long periods if stored at reasonably constant and low temperatures.

4.7 MARINE OILS. PRODUCTION, GENERAL CHEMISTRY, AND UTILIZATION

Hetchler, John D. (Archer-Daniels-Midland Company, Cleveland, Ohio)
Journal of the American Oil Chemists' Society 31, No. 11, 503-508 (November 1954)

Among the principal marine oils of industrial importance are those obtained from herring, menhaden, and pilchard. Other important marine oils, which are produced in smaller amounts, are the various whale oils, salmon oil, tuna oil, cod oil, and mackerel oil. Some of the marine oils are produced as byproducts of the fish-canning industry. Other marine oils, such as the fish-liver-oils, have food or medicinal value.

Most fish oils are obtained by pressing the cooked or steamed whole fish and removing the oil from the press liquor. The residual press liquor is usually concentrated to a thick syrup-like consistency and used as a feed supplement. The cake from the presses is dried and ground for use in animal feeds, particularly for poultry and swine. It is the demand for fish meal that frequently controls the production of fish oil. Table I, omitted, summarizes the annual production of oil and meal for the past 10 years.

Most of the marine oils are triglyceride esters of long-chain fatty acids. Sperm whale oil, however, is different in that it is composed largely of esters of higher fatty alcohols instead of glycerol. Fish oils are in a class of their own because they contain substantial amounts of fatty acids of longer chain length and greater degree of unsaturation than is found in the oils of land animals or plants. Fatty acids with as many as 26 carbon atoms and six double bonds have been identified. However, chain lengths of 20 or 22 carbon atoms and four or five double bonds are more usual. Fatty acid distribution for a number of typical fish oils is shown in table II, omitted, and the characteristics of

(over)

 ABSTRACTER: Martin Heerdt

4.13 SOUTH AFRICAN PILCHARD OIL. 3. THE FATTY ACID COMPOSITION OF SOUTH AFRICAN PILCHARD OIL

Silk, M. H. and Hahn, H. H. (National Chemical Research Laboratory, Pretoria, South Africa)
Biochemical Journal 57, No. 4, 577-582 (August 1954)

The complete analysis of the fatty acid composition of marine oils is a matter of extreme complexity, owing to the fact that acids of differing chain length and unsaturation are encountered. Acids of from 12 to 28 carbon atoms in chain length have been reported, the higher members containing as many as six or seven double bonds per molecule.

A new approach to the analysis of marine oils without isolation of individual component acids has been developed. The technics of lithium soap-acetone segregation, molecular distillation, reversed-phase partition chromatography, and urea-complex fractionation were used in successive subdivision of pilchard-oil fatty acid fractions. By application of these technics, a fraction was obtained having a composition that could be calculated.

Total pilchard-oil fatty acids were treated by the lithium soap-acetone technic to give a concentrate of the more highly unsaturated acids. These represented 29.5 percent of the total acids present. The fraction had an average equivalent weight of 311 and an average of 4.62 double bonds per molecule.

The unsaturated fatty acid fraction was subjected to separation in a three-stage falling-film molecular still. Six fractions were obtained. Samples of the six fractions were chromatographed on kieselguhr supporting liquid paraffin as the stationary phase. Aqueous acetone was used to develop the chromatograms.

(over)

 ABSTRACTER: W. N. Sumerwell

4.91 STUDIES ON THE NUTRITIVE VALUE OF LIPIDS. XI. NUTRITIVE VALUE OR TOXICITY OF HIGHLY UNSATURATED FATTY ACIDS (2)

Kaneda, Takashi; Sakurai, Hisae; and Ishii, Seinosuke
Bulletin of the Japanese Society of Scientific Fisheries 20, No. 1, 50-57 (1954) (English summary and tables)

In the previous paper we have established that the nutritive value of highly unsaturated fatty acids is not much lower than that of oleic acid, and that long-believed toxicity of highly unsaturated acids is not produced by the acids themselves but actually by formation of autoxidized matters.

The observation led us to an assumption that natural unsaturated fatty acids around C_{18}, even if different in the autoxidation degree, would always become less nutritious by some autoxidation.

The assumption was confirmed by examining the toxic effect on rats of the autoxidized product, which was prepared from the ethyl ester of liquid acids of linseed oil as the rats were all dead a few days after the feeding.

On the basis of these findings our efforts have been extended to throwing light on the structure of the toxic product of the above description. The result obtained from the present test indicates that the most toxic structure in autoxidized unsaturated fatty acids is peroxide which has been produced at the beginning of autoxidation.

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4.11 ANALYTICAL METHODS AND COMPOSITION OF FATTY MATERIALS

Riemenschneider, R. W. (Eastern Regional Research Laboratory, Philadelphia, Pennsylvania)
Journal of the American Oil Chemists' Society 31, No. 11, 517-523 (November 1954)

Progress in the utilization of commercial fats and fatty acids as raw materials in the manufacture of industrially useful products is dependent to a large extent on knowledge of the composition of the starting material and of fractions derived from it.

As a first step in the determination of fatty acid composition, it is general practice to characterize the sample by determining its chemical and physical constants. The constants usually determined include iodine, saponification, and thiocyanogen numbers, refractive index, unsaponifiable matter, titer, melting point, moisture, and color.

The iodine number is a measure of total unsaturation and is useful for calculating composition in simple mixtures of two known unsaturated components, or two known unsaturated and a known percentage of saturated components. Thiocyanogen numbers may be used in conjunction with iodine numbers to estimate the percentages of oleic, linoleic, and saturated acids or esters in fats or fractions containing only these components.

The saponification number of fatty acid esters or the neutralization equivalent of fatty acids is a useful constant, since it is a measure of the average chain length or mean molecular weight.

In the past decade, ultraviolet spectrotometric methods have been developed that are greatly useful for studying the composition of natural fats and oils. Most of the common polyunsaturated fatty acids are non-conjugated and show no absorption in the near ultraviolet above 200 mμ. These

(over)

 ABSTRACTER: W. N. Sumerwell

4.7 (Cross Reference: 4.8)

some of these fatty acids is shown in tables III and IV, omitted. Table V, omitted, illustrates the wide range of properties found in fish oils obtained from a single species (Atlantic herring) throughout one season.

The more saturated triglycerides may be removed from fish oils by chilling to crystallize the solid fats, which are then removed by filtration. This process yields a liquid oil of high iodine value for use as a semi-drying oil. The more saturated triglycerides may also be removed by selective extraction with solvents, a process that is used commercially to produce fish oils with iodine values ranging up to 220. It is also possible to produce fish-oil fatty acids with iodine values as high as 300 by fractional distillation, but these products have not been widely used because of the economics involved. Pressed oil can be alkali-refined to lower the acid value and bleached to reduce the color.

Fish oils intended for use as drying oils in protective coatings may be bodied by blowing with air or by heating. Heat-bodied oils that have been solvent-extracted for the removal of unpolymerized portions have excellent drying properties. Fish oils also may be co-polymerized with other unsaturated monomeric materials, such as styrene or cyclopentadiene. Cyclopentadiene copolymers are commercially important drying oils that can be used to improve paint and varnish to a remarkable degree.

Fish oils are used in quantities in paints and varnishes. Fish-oil-based coatings can be recommended for metal surfaces because they penetrate rust and resist salt water. The drying properties of fish oils make them useful in the manufacture of linoleum, caulking compounds, oilcloth, and printing inks. Their properties also make them of value as slushing oils, wood preservatives, leather dressing, metal-drawing compounds, and lubricating-oil additives. Hydrogenated fish oils find use as lubricants, textile chemicals, buffing compounds, and as an edible shortening for bakery goods.

4.11

substances can be conjugated by simple treatment with alkali at high temperatures, and the conjugated isomers have well-separated spectra in the ultraviolet region from 200 to 400 mμ.

Each of the conjugated acids have three principal absorption maxima. Equations for calculation of polyunsaturated acid content of fats, based on absorption data, are available in the literature.

Marine oils contain a very complex mixture of polyunsaturated acids, some of which differ from those of the common fats and oils and for which absorption data have not been determined.

Chromatographic technics can be used for the separation of fatty acids, and such methods offer considerable promise of becoming very valuable in fat chemistry.

The use of infrared absorption spectroscopy as an analytical tool in composition studies on fats and oils is rapidly developing. Infrared absorption is being used at the present time for the detection and estimation of geometrical isomers of unsaturated acids and for the qualitative identification and approximate estimations of various oxygenated groups formed during oxidation and drying of oils.

4.13

Samples of the six fractions were also hydrogenated, and the resulting mixtures of saturated acids were analyzed for chain-length distribution by reversed-phase partition chromatography.

The first subfraction (distillation temperature, 96° C.) obtained from the molecular still was treated successively with urea dissolved in absolute ethanol. By this treatment, the following were obtained: (a) four subfractions that formed urea complexes and (b) one subfraction that contained the non-complexed residue. Each of these fractions were then subjected to reversed-phase chromatography.

From the results of the chromatography of the residual non-complexed fatty acid fraction and from the finding that this fraction had an average equivalent weight of 263 and an average of 3.68 double bonds per molecule, it was possible to calculate the composition of the fraction. The results were 52.7 percent C_{16} tetraene, 26.6 percent C_{16} triene, 11 percent C_{18} triene and 9.7 percent C_{20} tetraene.

7.89 REPORT ON CHEMICAL INDICES OF DECOMPOSITION IN FISH (HISTAMINE)

Williams, David W.
Journal of the Association of Official Agricultural Chemists 37, No. 3, 567-572 (August 1954)

Fish in various stages of decomposition were analyzed for histamine content by the bioassay method to see if histamine could be used as an index of decomposition. The results of these determinations are given in table 1 (over).

The work shows that the amount of histamine-like substances in canned fish correlates well with the organoleptic classification of the raw material in the tuna and mackerel-like fishes. There is some indication that the method can be used for detecting spoilage in canned salmon and canned codfish.

The histamine content in good canned fish was low, whereas the content in badly honeycombed fish was high. Small fish appeared to have a greater histamine content than did large fish.

The author recommends (1) that the bioassay method for the determination of histamine-like substances be given a collaborative study; (2) that the chemical method for histamine be given additional study; and (3) that further experimental decomposition packs of canned fish be prepared and then analyzed by the bioassay method.

(over)

 ABSTRACTER: G. M. Pigott

7.775 SAPONIFICATION VALUE DETERMINATIONS OF DIFFICULTLY SAPONIFIABLE DRYING OIL PRODUCTS

Shaw, John N. and Formo, Marvin W. (Archer-Daniels-Midland Company, Minneapolis, Minn.)
Journal of the American Oil Chemists' Society 31, No. 11, 448-451 (November 1954)

The use of more complex drying oil products, such as dicyclopentadiene copolymers and alkyds, styrene copolymers and alkyds, and maleic modified drying oils has created a need for a straightforward method for their quantitative saponification.

The authors studied n-butyl alcohol as a solvent for the saponification of a representative series of drying oils. Their work indicates that n-butyl alcoholic potassium hydroxide reagent gives very acceptable results on the basis of calculated saponification values if 5 percent water is added to the saponification reaction mixture.

Except with maleic-modified oils of certain types, the solvent system of ethyl alcohol-pyridine gave excellent results on the basis of calculated saponification values. This system, however, has two disadvantages: (1) it is a two-solvent system, and (2) pyridine, of reagent grade, is required to avoid end-point difficulties.

For some reason, the end-point in the butyl alcohol system is not as sharp as is the normal saponification end-point in ethyl alcohol. This lack of end-point sharpness may be due to the two-phase nature of the titration mixture. If ethyl alcohol is added to the n-butyl alcoholic saponification mixture, the end-point sharpness can be improved. However, the end-point is not made as sharp as it is in the regular ethyl alcohol system. Efforts are now under way to improve the sharpness of the end-point.

 ABSTRACTER: Martin Heerdt

7.872 DETERMINATION OF FAT PEROXIDES IN THE PRESENCE OF PHOSPHOLIPIDS

Hartman, L. (Fats Research Laboratory, Department of Scientific and Industrial Research, Wellington, New Zealand)
Journal of the Science of Food and Agriculture 5, No. 10, 476-481 (October 1954)

The ferric thiocyanate method for determination of rancidity, although giving vastly too high results with oxidized oils, is more sensitive than is the iodometric method for oils at an early stage of oxidation. The method, however, suffers the limitation that phospholipids interfere.

A new colorimetric procedure has been devised which eliminates the interference of phospholipids. The fat peroxides in benzene-methanol solution are reduced with a measured quantity of ferrous chloride, and the excess ferrous ions are then oxidized with a measured quantity of dichlorophenol-indophenol at room temperature. The color is measured with a Beckman spectrophotometer at 530 mμ. A blank is run, and the difference in readings corresponds to the ferric iron formed from the peroxides.

Results using this method are reported for a number of fats and oils, including those extracted from two species of fish (see accompanying table, this card, over).

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 ABSTRACTER: M. E. Stansby

7.43 A PHOTOELECTRIC METHOD FOR THE RAPID DETERMINATION OF MOISTURE IN BIOLOGICAL MATERIALS

Siddappa, G. S. and Das, D. P.
Current Science (India) 23, 157-8 (1954)
Chemical Abstracts 48, No. 21, 12854 (1954)

A modified method of Launer and Tomimatsu that required 10-15 min. is described. A finely ground portion of material is dild. with a known quantity of water. To this soln. 25 cc. of 1.835N dichromate and 40 cc. of concd. H_2SO_4 are added. The mixt. is allowed to stand 3-5 min. A portion of the mixt. is placed in a test tube and rapidly cooled to room temp. under tap water. The color is measured in a colorimeter, and compared with previously detd. samples. The accuracy and reproducibility of this method are quite high.

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INDICES OF DECOMPOSITION

RANCIDITY TEST

SAPONIFICATION VALUE DETERMINATION

DETERMINATION OF MOISTURE

7.872

Peroxide values in micro-equiv. per 1 g. of fat and 1 g. of dry sample, respectively, and percentage of phospholipids in various fat extracts

Sample	Ferric thiocyanate method		Ferrous chloride-indophenol method		Phospholipids, %, in fats extracted with	
	Benzene at 60°	Benzene-methanol at 60°	Benzene at 60°	Benzene-methanol at 60°	Benzene at 60°	Benzene-methanol at 60°
Blue cod (Parapercis colias)	2.39 (0.10)	Nil	5.03 (0.21)	28.15 (3.14)	55.21	48.24
Ling (Genypterus blacodes)	9.23 (0.12)	Nil	18.48 (0.24)	27.97 (1.13)	-----	-----
Ling (oxidized)	14.62 (0.19)	Nil	23.10 (0.30)	170.40 (6.88)	31.53	29.55

7.89

TABLE 1.—*Histamine-like substances present in experimental packs of canned fish*

Fish	mg./100 g. as histamine			
	Stage 1	Stage 2	Stage 3	Stage 4
Tuna	2.6, 3.4	1.3, 3.0	36.2, 34.3, 37.9, 37.6	—
Yellowfin Tuna	0.4, 0.8, 0.3, 0.9, 1.3, 0.3, 2.6, 0.8, 0.3, 1.7, 3.8	0.8, 1.4, 1.6, 1.8, 0.8, 3.3, 0.6, 4.0	8, 10, 29, 40, 5, 5, 10, 8	7, 14, 29, 10, 9, 39, 55
Bluefish Tuna	3, 3, 0, 4, 3, 1, 1, 1	3, 3, 6, 2, 3, 3, 9, 9	17, 15, 26, 15, 8, 16, 9, 16	211, 12, 11, 133, 12, 48, 181, 181
Av.	3	4	15	98
Yellowfin Tuna	—	2.9, 7	—	39, 26, 43
Eastern Little Tuna	0.6	—	—	60
Honeycomb Yellowfin Tuna	No Detectable Odor After Precooking			99
Pacific Mackerel	0.2, 0.6, 1.1	—	26, 58, 10, 12, 47, 14	—
Av.	0.6		31	
Pacific Mackerel	0.3, 0.3, 0.2, 0.2, 0.1, 0.1, 0.5	—	124, 234, 181, 146, 304, 210, 159, 279	
Av.	0.2		Blanks 3 and 4-182	
California Sardines	3, 6, 2, 1, 1, 3.1	—	289, 278, 243, 296, 268, 282, 230, 362	
Av.	3		Blanks 3 and 4-291	
Silver Salmon	Trace, 0, 2, 0, 0, 0, 0	—	38, 15, 15, 4, 19	
Av.			19	
Crabmeat	None found in any stage of this pack			

7. 80 THE FRESHNESS OF FISH AND THE AMOUNT OF HISTAMINE PRESENT IN THE MEAT

Kimita, Masao; Kawai, Akira; and Tanaka, Mikio
Bull. Research Inst. Food Sci., Kyoto Univ. No. 12, 24-8; 34-9 (1953)
Chemical Abstracts 48, No. 21, 13119 (1954)

VI. The production of histamine during autolysis. 4.

In the meat of shark and octopus histamine was not formed during autolysis. Histidine was not detected before and after the autolysis in the meat of these animals. In shark, about 12 mg. per 100 g. meat of NH_3 content increased to about 20 mg. after autolysis for 300 hrs. independently of the H ion concn. of the medium. It was suggested that the increase of NH_3 is not due to the action of ordinary urease. The manner of increase of amino N in the meats of these animals during autolysis resemble that in white meat fish, the rate of increase being comparatively slow and the optimum pH being about 4. 5.

VII. The production of histamine during the bacterial decomposition of fish meat. 3.

During the bacterial spoilage of white-meat fish, histidine in free form was not detected irrespectively of the degree of the freshness. The amts. of ammonium N, amino N, and histamine in the meats increased with the progress of the spoilage and their increases were faster in speed with the rise of temp. Histamine was produced after the production of ammonium and amino N started. The histamine produced in the white meat fish was small in amt. in comparison with that in the red meat fish and it appeared to be derived from histamine liberated by the bacterial decompn. of muscle protein. When the spoilage was recognized visually, the amts. of histamine in meats were always

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7. 80 RELIABILITY OF TASTE TESTING AND CONSUMER TESTING METHODS II. CODE BIAS IN CONSUMER TESTING

Ishler, Norman H.; Laue, Elsie A.; and Janisch, Anna J. (Central Laboratories, General Foods Corporation, Hoboken, New Jersey)
Food Technology 8, No. 9, 389-391 (September 1954)

Each year, the food industry carries out a large number of consumer tests in an effort to help the manufacturer find out what the consumer wants. Many precautions are taken to insure that the results reflect a true picture. Included in these precautions are the coding systems used to identify the samples. A variety of coding systems, including ones that are based on letters, numbers, colors, and geometric shapes, are in use. Literature concerning code biases as manifested in consumer product testing is extremely limited.

There is a diversity of opinion concerning the prevalence and importance of code bias in consumer testing. Although some groups seem to have ignored the problem, several groups are keenly aware of the presence of code bias. Letters appear to be preferred in proportion to their familiarity, and even numbers are generally preferred to odd numbers. It has been suggested that circles, squares, and diamonds be used as code symbols.

Some groups try to eliminate the effect of any bias by the type of experimental design used. For example, if Product One is being compared with Product Two, the code is set up so that code A = Product One, B = Product Two for one half of the cases, and the code is reversed for the other half.

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ABSTRACTER: Kathryn L. Osterhaug

7. 51 DENATURATION OF MYOSIN IN FISH MUSCLE AND IN MYOSIN SOL BY SALTS

Nikkila, Olavi E. and Linko, Reino R. (Central Laboratory of Tukkukauppojen Oy, Turku, Finland)
Suomen Kemistilehti 27B, No. 5/6, 37-42 (1954) (In English)

The authors studied the effect of solutions of sodium, potassium, and magnesium chloride and glucose on the denaturation of myosin both in situ and in the isolated form.

Skinless fillets of Baltic herring (Clupea harengus var. membranus) were immersed in sodium, potassium, or magnesium chloride solutions of various concentrations or in 0. 61M glucose solution at 0° C. and pH 7 for up to 170 hours. Soluble proteins were extracted from the fillets in a Waring blendor at 0° C. with 0. 855N chloride solution obtained by diluting the original brine with water. The myosin present in this extract was precipitated by diluting it tenfold with distilled water at 0° - 5° C. The precipitated extract was allowed to stand overnight in the refrigerator, and the myosin was then centrifuged off. Myosin nitrogen was determined by a micro-Kjeldahl modification described in the A. O. A. C. Myosin sol was obtained by redissolving the isolated myosin precipitate in a 5 percent brine at 0° C.

The Kjeldahl-Gunning-Arnold method was used to estimate total nitrogen and soluble nitrogen. The same method was used to determine non-protein nitrogen after precipitation of the protein from a 5 percent trichloroacetic acid solution.

Myosin denaturation occurred at about 3 percent sodium chloride concentration. The rate of denaturation varied with the salt concentration, and the final degree of denaturation was about equal for brines containing 5, 7. 5, 10, 15, or 25 percent sodium chloride. Myosin comprised about 6 to 13

(over)

ABSTRACTER: Martin Heerdt

7. 591 ENZYMIC CLEAVAGE OF ANSERINE IN SKELETAL MUSCLE OF CODLING (GADUS CALLARIAS)

Jones, N. R. (Torry Research Station, Aberdeen, Scotland)
Biochemical Journal 57, No. 3, xxiv (July 1954)

Extracts of muscle from gutted, iced codling were prepared and chromatographed as described by Jones. Serial chromatograms showed increasing amounts of free L-1-methylhistidine and β-alanine during the earliest phase of spoilage before bacterial invasion of the tissue. An increase in the foregoing components was also found in sterile lysing muscle homogenates and cell-free aqueous muscle extracts held at 0° and 15° C.

Free L-1-methylhistidine and β-alanine were subsequently isolated from muscle autolysates by separation on ion-exchange resin columns. These amino acids probably were derived from anserine (β-alanyl-L-1-methylhistidine), which is present in codling muscle to the exclusion of the related dipeptide carnosine. Incubation of added anserine with aqueous muscle homogenates or cell-free extracts led to increased β-alanine and L-1-methylhistidine formation in systems buffered at pH 7. 0 with 0. 05M phosphate or 0. 03M veronal.

During dialysis of the muscle extracts against water, it was discovered (1) that the anserine-cleaving activity of the extracts was not dialyzable and (2) that considerable high-molecular-weight material was precipitated out of solution without loss of anserine-cleaving activity in the solution. The muscle extract after having been subjected to dialysis against water was (1) free from substrate and its products, (2) stable to freeze-drying, and (3) able to withstand concentration under reduced pressure at an external temperature of 35° C. without appreciable loss of activity.

(over)

ABSTRACTER: Martin Heerdt

7.51 (Cross Reference: 0.32)

percent of the total protein nitrogen dissolved in the brines. Sodium and potassium chlorides (5 percent each) had a very strong effect on the solubility of myosin in situ. The sodium and potassium chlorides rapidly and completely denatured the myosin; whereas magnesium chloride exhibited a much weaker effect on myosin, and glucose exhibited no effect whatsoever. Thus the solubility decrease cannot be explained by osmosis or an ion effect, but is attributed to the influence of cations. Sodium chloride in 5 percent solution decreased the solubility of myosin, but the myosin could be extracted completely in the same brine if the muscle was ground in a Waring blendor at 0°C. Isolated myosin was more resistant to electrolytic effects than was in situ myosin. An almost saturated salt solution was required to precipitate out the isolated myosin.

7.591 (Cross References: 0.38, 7.593)

Extract preparations that were heated to 100°C. for one minute in the presence or absence of neutral salts or substrate lost all of their anserine-cleaving activity. This activity was likewise destroyed by precipitation with acid. The name "anserinase" has been suggested for the anserine-cleavage factor because its properties indicate that it is an enzyme. The present paper is the first report of anserinase activity in muscle.

7.80

less than about 5 mg.% and were independent on the preserving temp. In the white meat fish, if histamine alone is produced as toxic substance in the early stage of the spoilage, the freshness as estd. by the detn. of the amt. of NH_3 present in the meat appears reliable from the sanitary point of view, since a large amt. of NH_3 is produced before histamine is produced.

7.80

Two types of testing techniques are used by the authors' organization in presenting samples to the consumer public for evaluation. In "store tests," participants visit booths in department stores and are asked to taste two coded samples side by side and then express a preference. Half the respondents taste one sample first; half taste the other first. All answers and comments are given verbally to the interviewer who records the information.

In "home tests," trained interviewers call on housewives personally to enlist their cooperation. Coded samples are left, and the housewife is requested to prepare the samples according to directions on the jar or box label. Questionnaires are filled in by the respondents and are collected by the interviewers after a 3-day period.

In several consumer tests using pairs of coffee samples, the results of the store and home tests failed to agree within the limits that might be expected by chance variation. Code bias was thought to be a possible factor in this lack of agreement.

Special store tests were set up to determine how serious the code bias problem might be. The codes were made especially prominent, and the participants filled in their own ballots. Identical samples of soluble coffee were used as the testing material.

The results of these tests are shown in table 1 (omitted).

It has been demonstrated that bias effect from codes can be minimized (1) by selecting code pairs that have been demonstrated to show little bias and (2) by reversing codes between test halves.

8.51 THE AMINO END-GROUP AND THE AMINO ACID COMPOSITION OF SALMINE

Velick, Sidney F. and Udenfriend, Sidney (Department of Biological Chemistry, Washington University School of Medicine, St. Louis, Missouri)
Journal of Biological Chemistry 191, No. 1, 233-238 (July 1951)

The salmine was prepared from the frozen testes of fish of the family Salmonidae, genus Oncorhynchus, which were obtained from commercial fishery runs. The dried salmine sulfate salt contained 20.7 percent sulfate and 25.0 percent nitrogen, corresponding to 31.5 percent nitrogen in the free base. The material migrated electrophoretically with a single boundary in phosphate and acetate buffers (pH 7.5 to 5.0) and showed a single sedimentation boundary with a sedimentation constant less than 1.

The salmine sulfate was hydrolyzed in hydrochloric acid to liberate the amino acids.

An analysis of the salmine hydrolyzate for aspartic acid, serine, proline, isoleucine, glycine, glutamic acid, alanine, leucine, valine, hydroxyproline, threonine, and phenylalanine was made by the isotope derivative method. The results of this experiment indicate that phenylalanine, threonine, hydroxyproline, aspartic acid, and glutamic acid are either not present in the hydrolyzate or are present as trace impurities.

Analysis of salmine hydrolyzate was made by chromatographic fractionation on a Dowex-50 column followed by colorimetric determination of the individual amino acids by the photometric ninhydrin method. Arginine, proline, serine, valine, glycine, alanine, and isoleucine were found in salmine by this procedure.

(over)

 ABSTRACTER: W. N. Sumerwell

8.59 STUDIES OF FISH SPOILAGE. III. THE TRIMETHYLAMINE OXIDE CONTENT OF THE MUSCLES OF NOVA SCOTIA FISH

Beatty, S. A. (Atlantic Fisheries Experimental Station)
Journal of the Fisheries Research Board of Canada IV, No. 4, 229-232 (March 1939)

Because of the importance of trimethylamine oxide in studies of fish spoilage, and because of the conflict of evidence as to its occurrence in nature, a survey was undertaken to determine its occurrence in the fresh-water and sea fish of Nova Scotia.

The trimethylamine oxide was determined on press juice by Lintzel's method (1934). Press juice rather than muscle itself was used because previous work had been done mainly on press juice. Analysis of press juice and muscle of Clupea harengus showed the press juice to be approximately 19 percent higher in oxide than the muscle itself.

The results of the analyses are shown in table I (this card, over).

The muscle of all fish examined that live constantly in sea water contains appreciable quantities of trimethylamine oxide. The oxide was not found in the muscle of fresh-water fish nor in eels while in fresh water.

The difference between sea fish and fresh-water fish may indicate a different mechanism of spoilage. Trimethylamine is one of the earliest compounds produced during the spoilage of sea fish, and is definitely responsible for some of the spoilage odor.

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 ABSTRACTER: Kathryn L. Osterhaug

8.53 PROXIMATE ANALYSIS OF BRITISH COLUMBIA HERRING IN RELATION TO SEASON AND CONDITION FACTOR

Hart, John Lawson; Tester, Albert L.; Beall, Desmond; and Tully, John P. (Pacific Biological Station, Nanaimo, B. C.)
Journal of the Fisheries Research Board of Canada IV, No. 5, 478-490 (February 1940)

Herring (Clupea pallasii) were sampled from the British Columbia commercial herring fishery at intervals from October 1931 to July 1933. The fish varied in freshness at the time of sampling from very fresh fish, a few hours out of the water, to quite stale fish, several days out of the water. The latter fish had lost much of their scales. Twenty fish were selected at random, wiped with a moist cloth, packed in a No. 2 1/2-size can filled with boiled water, sealed, and processed at 15 pounds pressure for 75 minutes. Three such cans were prepared for each lot for determination of oil, protein, and ash. A fourth can containing no added water was prepared for moisture determination.

Analyses were carried out on the macerated, thoroughly mixed contents of each can by the usual procedures, except for oil content, which was determined by a 4-hour soxhlet extraction of the dried sample with carbon tetrachloride.

Water content varied from 64.2 percent to 80.2 percent; oil from 4.1 percent to 19.4 percent; protein from 10.1 percent to 16.8 percent; and ash from 1.9 percent to 2.8 percent. Oil content was highest in summer and declined during the fall and winter, reaching a minimum value after the spawning period in early spring. A decline in the weight of the fish accompanied this decrease in oil content. Calculated calorific values varied from 426 to 1090 calories per pound.

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 ABSTRACTER: M. E. Stansby

8.8 INDIVIDUAL VOLATILE ACIDS, SUCCINIC ACID, AND HISTAMINE AS INDICES OF DECOMPOSITION IN ATLANTIC "LITTLE TUNA" (EUTHYNNUS ALLETERATUS)

Hillig, Fred (Division of Food; Food and Drug Administration, Washington, D. C.)
Journal of the Association of Official Agricultural Chemists 37, No. 4, 927-931 (November 15, 1954)

Individual volatile acids, succinic acid, and histamine may be used to evaluate spoilage in fish for canning. This paper applies these indices to an evaluation of the relative freshness of little tuna.

Frozen fish in good condition were used to prepare progressive decomposition packs. These fish were allowed to thaw and decompose on the cannery floor. At daily intervals, they were examined for general appearance and for the odor of small portions of flesh removed by an incision near the backbone. The fish were flushed daily to remove any accumulation of slime and to minimize dehydration. At various stages of decomposition the fish were cooked and canned by commercial methods.

Volatile acids were determined according to the procedure in the Official Methods of Analysis, 7th Edition. The method of Hillig, Patterson, and MacLean was used to determine succinic acid, and the method proposed by Geiger was used to determine histamine. The results obtained are classified according to the degree of decomposition into four classes. Class-1 fish showed no formic, propionic, nor butyric acids. The volatile acid numbers were low; and only small quantities of acetic and succinic acids were found. Histamine was not determined. Class-2 fish showed volatile acid numbers and formic acid contents that indicated no advanced decomposition, whereas class-3 and class-4 fish showed advanced decomposition. The wide variation in the data obtained indicates that the fish did not decompose uniformly. Histamine was not determined in class-3 fish. Average data for each decomposition class are presented in figure 1, this card, over.

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 ABSTRACTER: Martin Heerdt

AMINO ACIDS IN SALMINE

COMPOSITION OF B. C. HERRING

TRIMETHYLAMINE OXIDE

INDICES OF DECOMPOSITION

8.53 (Cross References: 8.51, 8.4, 8.43, 1.2, 1.0111)

Theoretical yields of oil that might be obtained under optimum commercial operating conditions were calculated. These calculations were carried out on the basis of substracting the amount of oil that ends up in the meal from the total oil found by analytical determination and applying a suitable factor of yield of meal per ton of raw fish. Results of these calculations follow.

Area where fish taken	Date taken	Oil content per ton	Oil in meal	Meal per ton	Oil in meal per ton	Oil production per ton	per metric ton
		gal.	%	lb.	gal.	U. S. gal.	liters
Shelter Arm	Dec. 7, 1931	36.2	8	410	4.3	31.9	133
Barkley Sound	Dec. 21, 1932	19.7	7	420	3.8	15.9	66.4
Nootka Sound	Jan. 4, 1933	16.2	6	430	3.3	12.9	53.8
Horswell Point	Mar. 12, 1933	10.5	5.5	440	3.1	7.4	30.9

A "condition factor," C, relating the weight to the length of the fish was calculated by means of the formula $C = \frac{1,000,000\ W}{L^{3.26}}$ where W = weight in grams and L = length in millimeters.

The condition factor was found to vary in a similar manner as the oil content, being at a maximum in the fall and a minimum in the spring.

8.8 (Cross Reference: 7.82)

These studies on "little tuna" demonstrate that volatile acid number, content of formic, propionic, butyric, and succinic acids and histamine are indices of decomposition and that these values correlate with the progress of decomposition of the raw material from which the canned product was prepared.

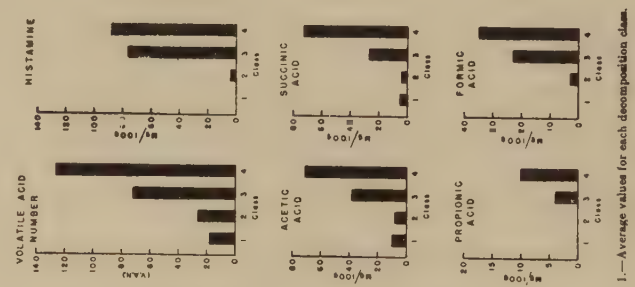

FIG. 1.—Average values for each decomposition class.

8.51

Two-dimensional paper chromatographs were run in phenol-water-ammonia and in lutidine-water systems. The seven amino acids found by chromatography with a Dowex-50 column were also found by paper chromatography.

Microbiological assays were carried out on the salmine hydrolyzate. Valine, prolein, serine, and isoleucine were shown to be present by these methods.

Consideration of the results of the various analyses shows that the ratios of the seven amino acids occurring in the salmine molecule are arginine, 34; prolein, 4; serine, 4; valine, 3; glycine, 3; alanine, 1; and isoleucine, 1.

The minimum molecular weight of salmine calculated from the analytical data is 7,000. Since salmine carries a larger positive charge and would not be expected to associate, the authors believe that 7,000 is also the true molecular weight of salmine.

Amino end-group analysis of salmine was made by the para-iodophenyl sulfonyl method. By this method, it was found that salmine has one proline amino end-group per minimum molecular weight.

8.59 (Cross Reference: 2.01)

Muscles of all sea fish examined contained trimethylamine oxide. Trimethylamine oxide was not found in muscles of fresh water fish.

The oxide was present in muscle of Pomolobus pseudoharengus that migrates into fresh water to spawn, but was absent in muscle of Anguilla while in fresh water.

The data throw no light on the physiological importance of trimethylamine oxide.

The production of trimethylamine by spoilage bacteria is likely to be a general phenomenon during the spoilage of all sea fishes examined.

TABLE 1. Trimethylamine oxide content of the muscle press juice of Nova Scotia fish.

	Number examined	Trimethylamine oxide (per cent) Maximum	Minimum	Average
SALT WATER SPECIES				
TELEOSTS				
Gadus callarias (cod)	50	0.78	0.39	0.67
Melanogrammus aeglefinus (haddock)	8	0.43	0.34	0.38
Pollachius virens (pollock)	7	0.50	0.44	0.48
Urophycis sp. (hake)	5	0.86	0.78	0.89
Clupea harengus (herring)	8	0.59	0.44	0.48
Scomber scombrus (mackerel)	10	0.29	0.22	0.26
Pseudopleuronectes americanus (flounder)	6	0.64	0.25	0.38
Limanda ferruginea (dab)	1			0.418
Glyptocephalus cynoglossus (witch)	6	0.56	0.23	0.31
ELASMOBRANCHS				
Squalus acanthias (dogfish)	6	1.59	1.25	1.43
Raja laevis (barndoor skate)	1			1.25
Raja senta (smooth skate)	1			0.53
Raja scabrata (prickly skate)	2			0.27
FRESH WATER SPECIES				
Perca flavescens (yellow perch)	5	0.00		
Ameiurus nebulosus (catfish)	6	0.00		
Catostomus Sommersonii (sucker)	2	0.00		
FRESH AND SALT WATER SPECIES				
Anguilla rostrata (eel)				
From fresh water	3	0.00		
" brackish water	3	0.001	0.006	0.004
Pomolobus pseudoharengus (gaspereau) from salt water	3	0.38	0.20	0.25

2.118 FREEZING FISH AT SEA

Eddie, G. C.
Food Manufacture 29, No. 11, 435 (November 1954)

Freezing fish at sea was discussed by the author at a joint conference of chemists and biologists held at Aberdeen, Scotland on September 30 to October 2, 1954.

About half of the fish landed in the United Kingdom is taken during voyages of more than 20 days' duration. These fish are stowed in crushed ice. (Atlantic cod can be kept in reasonably fresh condition in ice for about 12 days and remain saleable if kept in ice for a total of not more than 18 days.)

Less than one-half of the time of an Atlantic trawler is spent in catching fish, and the catch obtained usually occupies less than one-half of the available carrying capacity. These trawlers require extra horsepower to minimize the time spent in returning home.

To be successful in freezing fish at sea, the operator should have (1) a suitable freezing plant on board, (2) first-hand knowledge of the fishing-ground conditions, and (3) an adequate knowledge of the biochemical aspects of freezing. It is not easy to fulfill all of these conditions simultaneously. Each type of fishery has its own problems that require specific solutions. Experimentation with independent trawlers rather than with a mother ship with a fleet of catchers is believed to be the best solution to problems associated with freezing fish at sea.

Two different trawler-design projects are now under way in the United Kingdom. Project 1 is based on the use of a very large trawler completely different in design from the standard vessel but suited to the production of consumer packages of frozen fillets. Project 2 is based on the use of a

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 ABSTRACTER: Martin Heerdt

2.3 REPORT ON HANDLING OF PRAWNS

Empey, W. A. (Division of Food Preservation and Transport, New South Wales, Australia)
Fisheries Newsletter 13, No. 11, 5, 7, 23 (November 1954)

The author, in his survey of the handling and cooking of prawns received at the Sidney Fish Market, observed the following: (1) Cooking conditions were adequate to render the prawns free from viable micro-organisms when the prawns were held between 32° and 50° F. (2) Prawns from some smaller producing areas at times developed "black-head," owing to undercooking. (3) Contamination was found in the water used for immersion cooling of cooked prawns and in the wicker baskets used to hold the prawns during immersion. (4) Contaminated water produced contaminated ice used for packing cooked prawns, and further contamination was produced through contact of the crushed ice with dirty floors. (5) In some instances, a delay occurred in icing after cooking and cooling; in other instances, no icing was used at all.

In view of his findings, the author made a number of recommendations for the improvement of cooked prawns on arrival at market. In order of importance, he recommended that (1) bacteriologically clean water be used for cooling the prawns and for ice making, (2) ice packing of cooled prawns be done promptly, (3) sufficient ice be used to insure a maximum temperature of 40° F. in the prawns upon arrival at market, (4) clean packing boxes be used, and (5) hygienic methods of handling be put into effect.

Methods of handling could be improved through the (1) use of metal trays rather than wicker baskets for immersion cooling, (2) use of sanitary receptacles for ice and the ice shovel, (3) prevention of empty or packed containers from coming in contact with wet, dirty floors, and (4) maintenance of clean and regularly disinfected surfaces.

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 ABSTRACTER: Rosemary Schairer

2.43 NEW GERMAN PLASTIC FISH CONTAINER

Anonymous
U. S. Department of the Interior, Fish and Wildlife Service, Fishery Products Report S-7, Seattle, Washington, January 11, 1955

A new plastic container ("Kiel table container") for fishery products has been patented in West Germany, according to International Fish and Other Food Journal 11, No. 3, (1954), a Danish publication. The new container is made from polyvinylchloride (PVC) and is the product of a year-long development which began with the packing of fish and food specialities in pliofilm and polyethylene bags. It was perfected with the PVC container in a patented carton for protection against mechanical damage and for stiffening of the form of the container.

These are the fundamental differences between the PVC container in square-formed half cartons and the tin-plate can; PVC container can be opened readily and easily with the attached scratcher, the other end of which may be used as a fork to eat the contents of the container. The light weight of the plastic container reduces freight charges; the lower price of the plastic container should result in a larger turnover; the customer can see the goods. Further advantages are the noncorrosion factor of the PVC container and the avoidance of chemical "swells."

For the present, the new container will be hermetically sealed by an electrically heated apparatus, which means an air- and water-tight seal, only usable for half-preserves, i. e. cold, fried, or cooked marinated fish, smoked sliced saithe in edible oil, salted anchovies, herring fillets in oil or brine, gaffelbiddar, roe or caviar, marinated mussels, salads with herring, salmon, shrimp, lobster, vegetables, meat, etc. The development of the new container has only begun. In view of the versatility of the plastic materials and the speed of the development of the techniques, many possibilities exist.

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2.40 KEEPING QUALITY OF CHILLED DUNGENESS CRAB MEAT PACKED IN HERMETICALLY-SEALED CONTAINERS

Carlson, Clarence J. (U. S. Fish and Wildlife Service, Ketchikan, Alaska)
Commercial Fisheries Review 16, No. 11, 20-21 (November 1954)

Experimental work is being carried out at the Fishery Products Laboratory in Ketchikan, Alaska, to determine the keeping quality of dungeness crab meat when held at temperatures of 32° F. and above prior to freezing or after thawing. This project follows earlier studies which indicated that the storage life of frozen dungeness crab meat could be extended to 42 weeks by packaging the meat in hermetically-sealed, metal containers under vacuum and storing at 0° F. or below.

The data obtained on keeping quality at temperatures above freezing will provide a basis for formulating government purchase specifications and for developing practice recommendations for crab processing plants, wholesalers, shippers, and consumers. Organoleptic tests (color, flavor, odor, and texture), chemical determinations (volatile reducing substances, volatile nitrogen, indol, and pH), and total bacterial counts made at regular intervals will supply the needed information for following the course of spoilage of the product and could eventually lead to objective tests for better quality control.

The initial experimental work has been on the keeping quality of fresh (unfrozen) crab meat packaged in cans, sealed under a high vacuum or at atmospheric pressure, and stored at 40° F. The data from the organoleptic examination indicated that the storage life of chilled dungeness crab meat stored at 40° F. was 7 days when the meat was packaged dry in cans and hermetically sealed under a high vacuum. The acceptable storage life of crab meat packaged dry in cans and hermetically sealed at atmospheric pressure was 5 days at 40° F.

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 ABSTRACTER: Clarence J. Carlson

FREEZING FISH AT SEA

NEW GERMAN PLASTIC FISH CONTAINER

REPORT ON HANDLING OF PRAWNS

KEEPING QUALITY OF DUNGENESS CRAB

2.40 (Cross Reference: 1.86)

The information shown in figure 1 represents the results of only one test series. However, in this series there was a definite increase in bacterial count, volatile nitrogen, and volatile reducing substances in the crab meat during storage. It was observed that changes in quality were not detected organoleptically until 2 to 3 days following a significant increase in the number of bacteria.

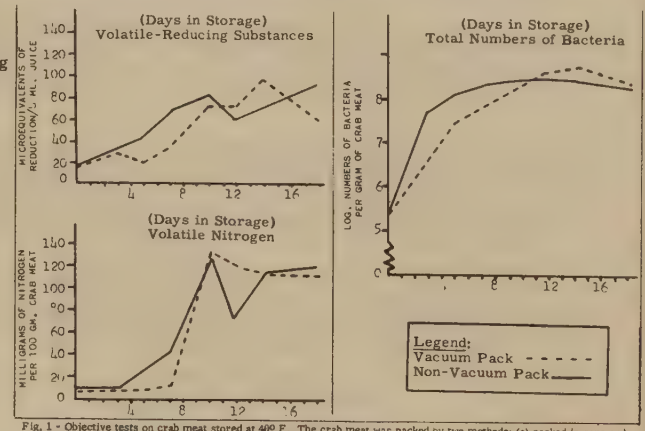

Fig. 1 - Objective tests on crab meat stored at 40° F. The crab meat was packed by two methods: (a) packed in cans and hermetically sealed under high vacuum, and (b) packed in cans and sealed at atmospheric pressure.

2.118

standard trawler equipped to freeze only the early part of its catch as whole fish. These frozen whole fish (cod) are intended to be thawed and processed into the usual forms on landing. Freezing would be of great benefit with the larger vessels. However, the existing fleet cannot be scrapped prematurely just to accept the new trawler design.

Handling of frozen fish on a large scale requires a cold-storage design that will prevent the fish from drying out. Experimental cold-storage rooms have been constructed at Torry Research Station that accomplished this desired effect by the maintenance of a high humidity.

Equipment has been designed for freezing whole cod in large blocks under the conditions found on standard trawlers. Any freezing installation on board a trawler must be of a size that is governed by the rate at which the fish are caught. A study of the catching rate and its fluctuations on board British Arctic trawlers has shown that the size of the freezer can be greatly reduced if the fish are held for a period of time prior to being frozen. The prototype freezer was used to determine the permissible limits for "buffer" storage of cod frozen at sea.

2.3 (Cross Reference: 1.85)

In implementing the foregoing recommendations, the proposal was made that sterilization of the water for cooling and for ice making could be accomplished by chlorination or by the use of ultra-violet light. For small establishments, the freshly caught prawns could be iced and delivered to processing factories with more adequate facilities. A time limit of 1/2 hour was suggested as a limit for icing the prawns after cooking. Adequate ice-packing together with storage at a temperature of 20° F. prior to pick-up would help conserve the ice in the packing boxes and help to maintain a low temperature during transit.

To eliminate "black-head" in prawns, a cooking time was suggested of 2 1/2 minutes in rapidly boiling water or 7-8 minutes in water at 194° F.

In handling surpluses of prawns, the recommendations were made (1) to freeze the cooked prawns as near the cooker as possible, (2) to insure that the prawns are as fresh as possible before freezing, (3) to reduce the size of the packing case now in use to one-half to allow for more-rapid freezing, (4) to maintain a temperature of 0° F. in storage, (5) to allow a maximum of 6 weeks as a limit for holding the prawns, (6) to market the frozen stocks in the order of their processing, and (7) to hold surpluses in the raw state in preference to the cooked state, since the raw prawns do not deteriorate as rapidly as do the cooked prawns.

2.03 THE ROLE OF AUTOLYSIS IN FISH SPOILAGE

Partmann, W.
Arch. Fischereiwiss. 4, 40-57 (1952-53)
Food Science Abstracts 26, No. 5, 515 (September 1954)

Protein breakdown (proteolysis) was investigated in homogenates from tench muscle and in blocks of tench muscle, during storage, at 0° to 20°C., for 2 to 3 months. Toluene, added as a preservative, did not always prevent microbial growth, but it had no effect on the course of proteolysis. The extent of protein breakdown was determined by measuring the increase in basic, free amino, and free tyrosine nitrogen, expressed as percentage of the initial value. In muscle blocks, the results were variable. In general, it was found that: during storage at 0°C. for more than 2 months, little increase in basic and amino nitrogen (about 20 to 30%) occurred; during storage at 20°C., however, a significant increase in tyrosine nitrogen occurred after 1 to 2 months. It is concluded that storage of tench in ice for 1 month or even longer is practicable and does not involve profound changes in proteins caused by autolysis.

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0.32 THE RELATION OF TENDERNESS TO PROTEIN ALTERATIONS DURING POST MORTEM AGING

Wierbicki, Eugen; Kunkle, L. E.; Cahill, V. R.; and Deatherage, F. E. (Ohio State University and Ohio Agriculture Experiment Station, Columbus)
Food Technology 8, No. 11, 506-511 (November 1954)

Actin and myosin react to give actomyosin reversibly during contraction and relaxation of muscle. Actomyocin is the protein that gives rise to rigor mortis. The authors decided to study these proteins by determining the amount of actomyocin in meat. A scheme was sought whereby meat could be fractionated at pH 5.6 so as to separate actomyocin from other proteins.

Since connective tissue is unusually high in hydroxyproline, this amino acid was used as an index of connective tissue in meat. The hydroxyproline was determined by a modification of the procedure of Newman and Logan, and a factor of 8.07 was used to convert the hydroxyproline to connective tissue.

A buffer solution designed to dissolve actin and myocin and other proteins but not to extract actomyocin was used for extracting protein. This solution was prepared essentially as reported by Sorenson, except that the potassium ion replaced sodium. Twenty grams of ground beef and 80 ml. of extracting solution were blended for 3 minutes, let stand for 5 minutes, and blended again for 1 minute in a Waring blendor. The suspension was filtered through glass wool on a Buchner funnel. The filtrate obtained was centrifuged for 30 minutes at room temperature. Two ml. of this extract was used for each nitrogen determination by micro-Kjeldahl technique.

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ABSTRACTER: Martin Heerdt

0.12 SIZE REDUCTION -- KEY TO PROCESS INNOVATION

Kovac, George M. (Cog Engineering Products Company, Chicago, Illinois)
Food Engineering 26, No. 12, 73-80 (December 1954)

New types of equipment and technic for reducing the size of raw material used in the manufacture of food products are described. These are discussed under the following headings:

1. Selective separation of usable and "non-usable" portions of products.
2. Complete size reduction of whole products.
3. Tandem combination systems.
4. Uniform presizing.
5. Combination size reduction and classification.
6. Air and mechanical classifying units.
7. Typical meat size-reduction units.
8. Single purpose designs.

Among the applications of such new equipment and technics which are mentioned are the following: (a) Production of baby food from cod fillets (see illustration, over). (b) Equipment for making a paste for Newburg sauces and salads from lobster and crab shells. The product, which is free from grittiness, has a brilliant color. The automatic machine that is employed utilizes all the shells and eliminates much hand labor. (c) Equipment for flash extraction of fat from animal tissue. (d) Machine for continuously converting fish waste to catfood. The unit includes provision for pregrinding, cooking, comminuting, dewatering, and filling. (e) Procedure in which chicken offal is ground with a solvent and the slurry is decanted and continuously extracted by a spray-blend technic. The ground rendered offal, which passes through corrugated pressure rolls, is formed into a dry granulated product.

(over)

ABSTRACTER: M. E. Stansby

0.6 ANNUAL REPORT OF THE FISHERIES RESEARCH BOARD OF CANADA, 1953

Kask, J. L.
Annual Report of the Fisheries Research Board of Canada for the Year 1953, 185 pp.

The Fisheries Research Board of Canada operates as the scientific research branch of the Department of Fisheries. The work of the Board is organized in three closely coordinated fields: biological, technological, and oceanographic.

The workers at the biological stations are concerned with the stocks of fish as they occur in the ocean or fresh water, finding where they are, how large they are, whether they can be increased, how they can be caught and what levels of fishing effort will exploit them most efficiently and effectively. The stations are located at St. Andrews, N. B.; St. John's, Newfoundland; Winnipeg, Manitoba; and Nanaimo, B. C.

At the technical stations, the workers devote their attention to the fish from the time they are taken out of the water until they are purchased by the consumer. These stations include the Atlantic Fisheries Experimental Station, Halifax, N. S.; the Gaspe Fisheries Experimental Station, Grand River, Quebec; and the Pacific Fisheries Experimental Station, Vancouver, B. C.

Oceanographic work is done at the Coast Biological Stations. Seven pages are devoted to the work of the "Canadian Joint Committee on Oceanography," which was organized in 1946 to supervise the joint programs of investigation.

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ABSTRACTER: Marjorie Zachow

AUTOLYTIC SPOILAGE

SIZE REDUCTION EQUIPMENT IN FOOD INDUSTRY

TENDERNESS VS. PROTEIN ALTERATIONS

FISHERIES RESEARCH BOARD OF CANADA

0.12 (Cross References: 2.06, 6.131, 1.86, 1.87, 6.53)

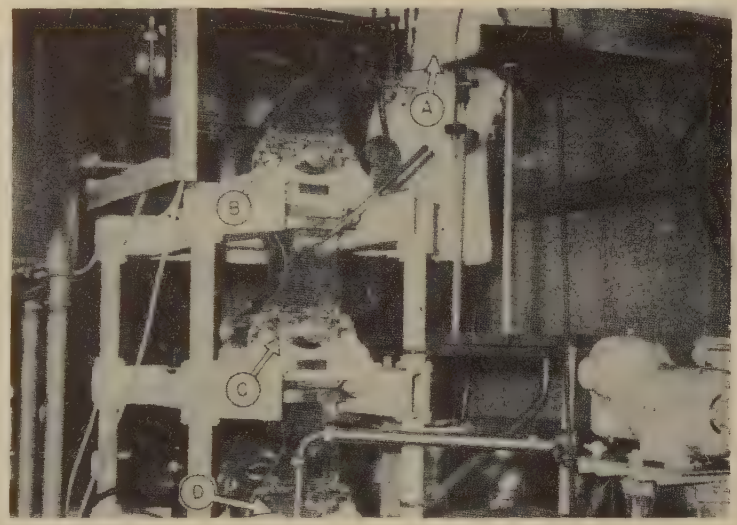

Figure 1.
Triple-stage unit for producing pureed baby food. Whole cod fillets fed into the machine at A pass down through comminutors (B, C, D) having successively smaller screen openings and leave the bottom as puree.

0.6 (Cross References: 9.4, 1.0111)

The work of the Atlantic Fisheries Experimental Station is reported under the following headings: fresh fish, frozen fish, salt fish, byproducts, marine oils, and engineering services. This report is covered in 15 pages.

The Gaspe Station is continuing its work on investigation of salt fish and marine oils. The studies on salt fish have consisted in determining the factors affecting the proper procedure in the Gaspe Cure and in determining the growth and means of destroying red halophiles affecting salted fish. Hydrogenating and fractionating seal and cod liver oils comprise the studies on marine oils. This report totals 7 pages.

The Pacific Fisheries Experimental Station advanced its basic and applied investigations on many aspects of the technology of marine and fresh-water fisheries products. Some of the investigations are as follows: nutrition and metabolism of bacteria associated with fish and fish spoilage; fish preservation studies; tests for freshness and quality of fishery products; use of refrigerated sea water in transporting fish at sea; brine-freezing fish at sea; refrigerated railway transportation; freezing and cold storage for land plants; canning; smoking; biological feeding value of herring meal; cellulose digestion by rumen micro-organisms and its stimulation by fishery byproducts; the Maillard reaction in fishery materials; studies concerned with cobalamins; marine oils and related products; chemical nature of salmon repellent materials; physical survey of fish processing plants; and other chemical investigations and services. This report totals 17 pages.

The publications of the Board in 1953 are listed, and the scientific staff at each of the stations is named. The report covers a total of 185 pages.

0.32 (Cross References: 7.51, 2.02)

Other samples of the extract were used for the determination of viscosity with an Ostwald viscosimeter, specific gravity with a Westphal balance, and refractive index with an Abbe refractometer.

Meat from 30 steers and bulls used in a 1950-51 castration study showed no breakdown of connective tissue (the alkali insoluble proteins of Husaini et al., 1950) either at 3 or 15 days post mortem. Meat from this same series of steers and bulls also showed no change in hydroxyproline. However, the tenderness did increase.

The percent of total nitrogen extracted by the buffer solution from meat used in the study reported upon in this paper was related to tenderness of meat at 15 days. This indicates that muscle plasma does have an effect on meat tenderness. It also appears that the index of refraction and the viscosity may be related to tenderness, but this relationship must be verified.

The findings further suggest that increases in tenderness with post mortem age may be related to (1) the dissociation of actomyocin or some similar protein changes that increase protein extractability and (2) the redistribution of ions within muscle, thus causing increased hydration and tenderness.

Other experiments conducted in Ohio showed that meat may be markedly modified in tenderness and behavior on cooking, freezing, and thawing, simply by changing the ionic nature of the muscle. Ionic changes may be accomplished by infusing whole or parts of freshly killed animals.

6.193 THE USE OF ANTIBIOTICS IN THE FOOD OF FATTENING PIGS

Robinson, K. L.; Coey, W. E.; and Burnett, G. S. (Queen's University of Belfast, N. Ireland)
Journal of the Science of Food and Agriculture 5, No. 11, 541-549 (November 1954)

Weanling pigs were fed all-vegetable rations and rations containing fishmeal, with and without procaine penicillin, both ad libitum and on a restricted basis.

In feeding trial No. 1, an all-vegetable ration based on groundnut meal and an animal-protein ration based on white fishmeal were supplemented with procaine penicillin (2 mg. per 1 lb. of meal). The rations were fed as wet mash from a trough as follows: (a) according to the Pig Experiments Co-ordination Committee (P.E.C.C.) recommendations and (b) according to the P.E.C.C. recommendations plus 15 percent additional ration. Pigs on the all-vegetable ration plus penicillin showed a 23-percent improvement in live weight throughout the 40-100 lb. weight range over pigs on the all-vegetable ration alone. Pigs on the fish-meal ration supplemented with procaine penicillin showed a 16-percent improvement in live weight over pigs on fishmeal only. In both groups, animals that had reached 100 lbs. in live weight showed very little further response. The P.E.C.C. recommendations of feeding resulted in a degree of underfeeding, whereas the P.E.C.C. recommendations plus 15 percent additional ration resulted in a degree of overfeeding.

The effect of the quantity fed on the response to procaine penicillin was determined in feeding trial No. 2. Rations with the same level of antibiotic were compared when fed according to the P.E.C.C. recommendations and according to the P.E.C.C. recommendations plus 15 percent additional ration. Procaine penicillin increased the rapidity with which the pigs ate both the all-vegetable ration and the fish-meal rations. The P.E.C.C. recommendations of feeding appreciably reduced the attainable live-weight gains.

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 ABSTRACTER: Martin Heerdt

6.13 FISH BY-PRODUCTS

Lovern, J. A.
Food Manufacture 29, No. 11, 436 (November 1954)

The primary interest of the fishery byproducts industry is the production of oil and protein feedstuffs from offal and unsalable fish. Two recent developments in the industry are (1) air-lift dryers and (2) peptized fish products.

Air-lift dryers operate at relatively low drying temperatures, very short drying intervals, and high capacities in relation to the size of the unit. This type of dryer discharges the product as soon as it becomes light in weight (e.g. dry).

Peptized fish products are receiving new interest as a replacement for conventional fishmeals. These peptized products have had most of their protein converted into water-soluble peptides, and may be marketed in either the liquid form (diluted or concentrated) or the dry form. Peptization may be accomplished either by the direct addition of a suitable acid (e.g. formic acid) followed by a period of digestion, or by ensiling the fish with a fermentable carbohydrate (e.g. molasses) and a lactic-acid produced organism. If these peptides are marketed as a liquid, the acidity of the product is ordinarily sufficient to prevent spoilage. Usually, only low-oil-content fishery materials are converted into water-soluble peptides. However, the oil can be removed from oily silage by heating and centrifuging.

The processing of oily raw material in an efficient manner is difficult because of alternate gluts and scarcities of fish, such as are encountered in the herring industry. This problem has induced the development of methods of storing the raw material. One early method used in Great Britain involved

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 ABSTRACTER: Martin Heerdt

6.199 EFFECT OF VITAMIN E AND OTHER SUPPLEMENTS ON HATCHABILITY OF TURKEY EGGS

Atkinson, R. L. and Couch, J. R. (Texas Agricultural and Mechanical College System, College Station)
Poultry Science 33, No. 5, 1039 (September 1954)

Beltsville White turkeys were maintained on wire continuously and were fed an all-vegetable protein diet. The diet was supplemented as follows: vitamin A 4500 U./lb. (9000 during the laying season), vitamin D 1200 U./lb., riboflavin 2 mg./lb., calcium pantothenate 12.5 mg./lb., niacin 20 mg./lb., choline 400 mg./lb., menadione 2 mg./lb. and vitamin B_{12} 6 γ/lb. At maturity, the hens were divided into eight groups of nine hens each and were mated with toms from the Poultry Husbandry Farm flock. The usual management and incubation procedures were followed.

The diets of the various groups were supplemented as indicated: group 1, none; group 2, vitamin E 20 mg./lb., group 3, fish solubles 5%; group 4, fish solubles 5% + vitamin E 20 mg./lb.; group 5, dried whey 3%; group 6, dried whey 3% + vitamin E 20 mg./lb.; group 7, fish solubles 5% + dried whey 3%; group 8, fish solubles 5% + dried whey 3% + vitamin E 20 mg./lb. Vitamin E increased hatchability in all groups where the vitamin was added to the basal diet.

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6.193 AN UNIDENTIFIED CHICK-GROWTH FACTOR FOUND IN LITTER

Jacobs, R. L.; Elam, J. F.; Fowler, Jean; and Couch, J. R. (Texas Agricultural and Mechanical College System, College Station)
Journal of Nutrition 54, No. 3, 417-426 (November 10, 1954)

In recent years, a number of substances -- including dried whey, fishmeal, fish solubles, liver, dried brewers' yeast, distillers' dried solubles, dehydrated alfalfa leaf, and antibiotics -- have been reported to stimulate growth in chicks.

The object of the present study was to investigate the presence in poultry litter of an unidentified growth factor that would increase the growth rate of chicks fed a diet complete with respect to the known nutrients.

The New Hampshire chicks used in the feeding studies were maintained in batteries with raised-screen floors. Feed and water were supplied ad libitum, and the chicks were weighed at weekly intervals during an experimental period of 10 weeks.

Samples of litter were obtained from poultry quarters where the litter had not been changed for at least 3 months. The litter samples were made into a water suspension by suspending 0.35 gram of litter per milliliter of water. The resulting suspension was filtered through cheesecloth, and the solid residue was discarded. Portions of this extract were autoclaved for 15 minutes at a pressure of 15 pounds and a temperature range of 121° to 125°C. The litter extract before being autoclaved was found to have a high Clostridia count.

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 ABSTRACTER: W. N. Sumerwell

FISHMEAL IN PIG RATIONS

VITAMIN E AND HATCHABILITY

PEPTIZED FISH AND AIR-LIFT DRYERS

CHICK-GROWTH FACTOR IN LITTER

6.193

In the first experiment, the autoclaved litter extract produced an increase in the growth rate of chicks when added to an all-vegetable-protein diet adequately supplied with the known B-vitamins. The addition of litter extract that had not been autoclaved did not stimulate growth, but this result is perhaps due to the high Clostridia population of the raw litter extract. The addition of penicillin to the diet also increased the growth rate of the chicks, and the addition of fish solubles had the same effect.

In the second experiment, it was found that antibiotics, autoclaved litter extract, and fish solubles were each capable of producing a growth response. When autoclaved litter extract was fed in combination with fish solubles a greater response was obtained than when either was fed separately. This additional response indicates that the growth factor in fish solubles is not the same as the one in autoclaved litter extract.

When autoclaved litter extract was fed with antibiotics, a growth response was again obtained that was greater than these substances gave when fed singly. This fact indicates that the mode of action of the growth substance in the autoclaved litter extract is not the same as that of antibiotics.

The experiments indicate that there is a chick-growth factor present in litter. The factor is thermostable and is probably produced by microbial fermentation.

6.193

All of the pigs were put on the all-vegetable control ration (without antibiotic) and fed according to the P.E.C.C. recommendations after they reached 120 lbs. live weight. Pigs deprived of both fishmeal and antibiotic suffered an impairment of appetite for a few weeks. According to the final live-weight gains, the earlier advantage in weight of the pigs receiving antibiotic was retained only by pigs on the all-vegetable ration.

In trial No. 3, the pigs received one of the following: (a) the standard all-vegetable ration, (b) a ration containing 7 percent fishmeal, or (c) a ration containing 12 percent fishmeal. Each one of these rations was fed without and with procaine penicillin at the rate of 2 mg. per lb. of meal. In this trial, the pigs made satisfactory weight gains on the all-vegetable ration and showed an additional response of 15 percent and 8 percent, respectively, on the 7-percent and the 12-percent fishmeal rations. No further antibiotic response was obtained from the fish-meal rations after the pigs reached 100 lbs., but there was a continued antibiotic response from pigs on the all-vegetable ration.

In trial No. 4, in which the pigs were fed according to appetite, the basal fish-meal ration was modified in various ways by the addition of procaine penicillin, liver meal, procaine penicillin plus liver meal, vitamin B_{12} (at the rate of 22μg. per lb. of ration), procaine penicillin or Aurofac 2A (chorotetracycline supplement containing 3.6 g. of chlorotetracycline hydrochloride per pound of ration together with an appreciable amount of cyanocobalamin (at the rate of 8 lb. per 1 ton of ration). The pigs on the 10-percent fish-meal ration (the control) gained an average of 1.23 lbs. per day both without and with penicillin. On a ration containing 5 percent fishmeal and 5 percent liver meal in place of the control ration, the pigs gained at a somewhat slower rate. On a ration containing 5 percent fishmeal and 5 percent liver meal plus penicillin, or penicillin and vitamin B_{12}, a very significant growth response over the controls was obtained. The growth response of pigs receiving the fishmeal plus Aurofac was outstanding.

6.13 (Cross Reference: 6.55)

the incorporation of sufficient alkali in the fish to prevent putrification and to permit subsequent complete peptization of the protein and recovery of the oil. This method had a number of disadvantages which caused it to be abandoned. The preservatives that are currently being used for the temporary storage of herring are formaldehyde and sodium nitrite. In some instances, the raw material is processed into presscake, which is then preserved against spoilage until it can be made into meal.

The seasonal nature of certain fisheries and the migratory habits of the fish (e.g. herring) have resulted in many proposals for floating oil and meal plants. Although these plants present some difficult economic problems, they are in the process of development in certain areas.

The processing of oily fish usually results in the removal of about one-half of the total water along with the oil. In some instances, even non-oily fish are cooked and pressed for the removal of a part of the water. The loss of dissolved proteins and finely suspended material is serious if the expressed fluid is discarded after the oil has been removed from it. In the U.S.A., this expressed water is concentrated and marketed as condensed fish solubles, whereas in Europe, it usually is returned in one form or another to the meal.

In the past, flame dryers for presscake have been operated without odor-control equipment. Some of these dryers are now being equipped with water-scrubbers for the removal of undesirable odors. If this type equipment should be found necessary for use with air-lift dryers, which discharge an enormous quantity of air, a new problem in design would be encountered.

3.231 THE DESIGN OF COLD STORES. PART I

Anonymous
Modern Refrigeration 57, No. 681, 422-424 (December 1954)

In the design of a cold-storage plant, the author lists the following features in the order of importance, although each feature affects and is affected by the others:

1. Lowest possible handling cost.
2. Highest possible handling tonnage per man hour.
3. Lowest possible labor cost.
4. Lowest possible heat loss.
5. Highest possible insulation efficiency.
6. Lowest possible running cost.
7. Lowest possible number of men on engineering staff.
8. Lowest possible land-area requirement.
9. Lowest possible constructional cost.

The operation of a cold-storage plant involves many variable factors. Work is spasmodic. Incoming packages are of different shape, weight, material, and heat content. Furthermore, these packages are usually in bulk quantities, whereas deliveries are usually in small quantities. Finally, the rate of turnover is variable.

Low handling cost can be achieved only by reducing labor cost. Mechanical handling in cold-storage plants requires wide loading banks, wide corridors, and suitable doors. The use of fork trucks, elevators, and gravity conveyors would require sweeping changes in cold-storage design.

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 ABSTRACTER: D. T. Miyauchi

3.230 IMMERSION FREEZING

Mingledorff, W. L.
Southern Fisherman 14, No. 12, 38, 79 (December 1954)

A Southern company has had under development a system for holding shrimp on large trawlers.

A sugar-and-salt solution studied by the Fish and Wildlife Service was experimented with by the author's company and was found to work very well for certain definite mixtures. The solution was finally perfected to the extent that shrimp could be frozen at 0° to 5° F. in 15 minutes or less, without the shrimp having any tendency to stick together. After a 60-day storage period in a large freezer room, the shrimp were still separate, and there was no visual sign of dehydration. Also, the shrimp, when thawed, looked as if they had just come out of the water. Some of the shrimp were iced and kept for a 7-day period. At the end of this time, they had the appearance of fresh shrimp. The same shrimp were frozen five times. With the quick-freeze method used, the shrimp were firm and had no tendency to separate from the shell.

From the knowledge thus obtained, the company applied the system to a commercial vessel. The final system employed a freezing tank on deck. Including insulation, this tank is approximately 4-feet 6-inches wide, 7-feet 1-inch long, and 4-feet high. The tank is stainless steel on the inside and contains the freezing plates and solution. It has a hydraulically-driven propeller that circulates the solution through the plates and then through the shrimp. A diesel-driven unit, approximately 6-feet 4-inches long, 2-feet wide, and 4-feet 10-inches high, which can be located wherever space is available, supplies the refrigeration. The use of plates and another diesel-driven unit converts the cargo hold to a frozen-storage room. This unit is slightly smaller than the freezing unit.

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 ABSTRACTER: Mabel Edwards

3.23 NEW PLANT FOR FROZEN FISH STICKS

Anonymous
Food Packer 36, No. 1, 34 (January 1955)

A new processing plant for fish sticks has recently begun operations in St. Louis, Missouri. The plant ships thousands of cases of fish sticks throughout the nation.

Block-frozen North Atlantic codfish and haddock are transported in carload lots from the east coast. These blocks, when cut into even-weight boneless and skinless fish sticks, are conveyed through a controlled-batter dip machine.

From the dip machine, the sticks are fed automatically into a breading machine, and from there they are belt-fed into a gas-fired continuous cooker. A 90° power turn carries them to an air-temperature-controlled cooling conveyor that finally delivers them to the packing room where ten 1-ounce sticks are packed in a carton and overwrapped with the company's label.

The time between unpacking the frozen fish blocks and refreezing the cooked and packaged fish sticks is kept to a minimum by the aid of the company's sharp-freezing facilities immediately adjoining the packing room.

The high quality of the raw product, the extraordinary care taken to see that all bones are removed, and the uniformity of the cooked, breaded fish sticks are the factors cited by the firm as contributing to the high quality of the fish sticks.

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 ABSTRACTER: Marjorie Zachow

3.63 NETHERLANDS FIRM TO PROCESS FISH POWDER

Anonymous
U. S. Department of the Interior, Fish and Wildlife Service, Fishery Products Report S-227, Seattle, Washington, November 23, 1954

A Gouda, Netherlands, engineering firm has acquired the licensing rights of a new method for processing fresh, lean sea fish into a fish powder with high nutritive value. This powder is suitable not only for animal feeding but also for human consumption.

The finely ground fish emulsion is converted according to this method into a dry substance which will keep for a considerable period and which possesses an albumen content, eight percent higher than that of ordinary fish meal. The process takes place on rollers heated by low-pressure steam, and is completed in 15 seconds. After this operation, the product is ready to be pulverized. It is possible to improve the taste of this fish powder by adding a suitable flavoring agent. Apart from its use as conditioning food, the meal is also suitable as a basic product for the food industry.

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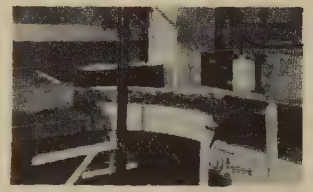
COLD-STORAGE DESIGN

NEW PLANT FOR FROZEN FISH STICKS

IMMERSION FREEZING OF SHRIMP

PROCESSING OF FISH POWDER

3.23



3.231

The trucking distance from loading bank to left entrance, the number of right- and left-hand turns, the distance from lift to storage rooms are factors affecting handling speed. The old-type trucking system, which has its advantages, would require loading bank, chamber doors, and elevator location best suited for its use.

One of the major sources of heat loss in the cold-storage plant is the door opening. Various devices have been used to reduce this loss: (1) single and double air locks, (2) flapper doors, (3) curtains, and (4) double curtains.

Doors may be of improper construction. In many plants they are of less thickness than are the walls. Doors should be made to open easily and have durable gaskets. The 6 foot 6 inch height of the standard door could be reduced without undue inconvenience.

Heat losses from defective insulation are primarily due to faulty erection rather than to defects in the material. It is possible to erect a good insulant correctly and to provide an efficient vapor seal, but such construction cannot be done cheaply.

A cold-storage plant may be designed as one large insulated shell that is divided into chambers by insulated walls, with one evaporator for all; or it may have a number of individual insulated rooms, each with its separate evaporator. It is debatable which of the two designs is more efficient.

3.230 (Cross Reference: 1.85)

When a drag for shrimp is completed, the shrimp are headed and thoroughly washed, weighed in 50-pound lots, and dumped into special stainless-steel wire baskets that have a patented closing device. Whenever convenient, the baskets are picked up and cocked to drain. Getting the shrimp to the holding room as soon as possible is important. At the end of the day, the shrimp in the baskets are dumped into 50-pound master cartons, and require no further handling until unloaded.

The author points out that in conventional methods, the shrimp are kept in a holding tank until the end of shrimping and are then packed in 5-pound cartons. The cartons are next placed on freezer plates. The freezing time for this method varies from 8 to 14 hours, owing to the fact that the lower shrimp freeze first and tend to insulate the carton. The shrimp must be glazed to hold them any length of time, which means opening each carton, pouring in water, and refreezing.

Because the immersion-frozen shrimp immediately separate, they are completely thawed in 30 minutes. The easy separation of the shrimp is very helpful to the retailers, who can take the number of pounds of shrimp needed from the 50-pound carton, wash them, and place them on sale immediately. Regular frozen shrimp can be marketed only in the original 5-pound carton. The same ease of handling applies in hotels and restaurants, where the shrimp can be thawed as needed.

The author states that most important of all is the fact that shrimp, quick-frozen soon after being caught, are definitely top quality. Experts have found it difficult to tell the difference between them and the fresh shrimp.

4.21 IRRADIATION EFFECTS ON LINOLEATE OXIDATION

Anonymous
Nutrition Reviews 12, No. 9, 286 (September 1954)

Ionizing radiations induce a chain reaction similar to autoxidation in unsaturated organic compounds such as linoleic acid. This observation raises the question of the possible role of such an irradiation reaction in a nutritional disorder, since unsaturated fatty acids occur universally in animal tissues. Also, since ionizing radiations are used in the preservation of some foods, it follows that foods must have some natural antioxidants which protect them from oxidation induced by irradiation.

Polister and Mead have studied the influence of several different antioxidants on the autoxidation of the methyl ester of linoleic acid as induced by ionizing radiations.

Vitamin A was effective at high concentrations in protecting the linoleate against oxidation, but the vitamin A itself was destroyed by the radiations.

Calciferol afforded partial protection to the linoleate and was itself stable to the radiations.

Cysteine, ascorbic acid, and glutathione afforded some protection against linoleate oxidation by ionizing radiations, but only at high concentrations. All three of these antioxidants were partially destroyed by irradiation.

Gamma-tocopherol and the commercial antioxidant 2, 6 di-tert-butyl-4-methyl-phenol, were the most effective in preventing the oxidation of methyl linoleate. Gamma-tocopherol was completely

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COMMERCIAL FISHERIES ABSTRACTS VOL. VIII NO. 3 PAGE 19
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: W. N. Sumerwell

4.2 AUTOXIDATION

Lundberg, W. O. (Hormel Institute of the University of Minnesota, Austin, Minnesota)
Journal of the American Oil Chemists' Society 31, No. 11, 523-528 (November 1954)

The author has summarized the chemical and physico-chemical aspects of the autoxidation of fats.

That triglyceride oils react chemically with the oxygen of the air was first recognized 125 years ago by the French chemist, DeSaussure, and the Swedish chemist, Berzelius. Within the last 100 years, it has been established that the initial products of the oxidation of fats consist largely of peroxides and that the secondary products are various aldehydes, ketones, and acids, which are the cause of rancid flavors and odors. It has been established that most of the peroxides formed with unconjugated unsaturated fatty esters do not have cyclic structures. The cyclic peroxides are formed predominately in the oxidation of esters of conjugated fatty acids.

About 15 years ago, Criegee reported that cyclohexene autoxidized without an appreciable decrease in the original unsaturation to yield a peroxide. This observation was confirmed by Farmer and his coworkers who found that the autoxidation of unsaturated fatty acid esters also occurred without any appreciable decrease in the original unsaturation. Other evidences have indicated that the peroxides are in reality hydroperoxides and that the hydroperoxide groups are attached to a carbon in an alpha position relative to a double bond. A further important finding was that free radicals are involved in the formation of the hydroperoxides.

Studies on the oxidation of esters of polyunsaturated fatty acids have revealed that, concomitantly with the formation of peroxides, double-bond shifts occur in such a way that considerable portions of

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COMMERCIAL FISHERIES ABSTRACTS VOL. VIII NO. 3 PAGE 19
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Martin Heerdt

5.7 STUDIES ON ENCEPHALOMALACIA IN THE CHICK. 1. THE INFLUENCE OF A VITAMIN E DEFICIENCY ON THE PERFORMANCE OF BREEDING HENS AND THEIR CHICKS

Singsen, E. P.; Matterson, L. D.; Kozeff, Anna; Bunnell, R. H.; and Jungherr, E. L.
(University of Connecticut, Storrs)
Poultry Science 33, No. 1, 192 (January 1954)

The experiments reported here were completed during the first year of a three year study of the encephalomalacia problem in chicks. The data indicate that very low levels of vitamin E intake, as reflected by low blood tocopherol levels, do not affect egg production or adult mortality over a period of nine months. The addition of α-tocopherol to breeding rations that were deficient in several other vitamins, resulted in a highly significant increase in fertility. This response to α-tocopherol was not obtained when a mixture containing ascorbic acid, vitamin K, and B-complex vitamins was added to the breeding ration. Data on the total blood tocopherol levels of day-old chicks definitely indicate that one or more of the vitamins in the above mixture was assisting in the utilization of tocopherols by either the breeding hen or the developing embyro.

Several cases of encephalomalacia were observed in unhatched embryos and day-old chicks.

Chicks hatched from vitamin E deficient breeding hens, and fed a vitamin E low diet containing 2 percent of oil of fish origin, consistently showed from 33 to 67 percent mortality. This mortality was largely due to encephalomalacia, and could be prevented by the addition of high levels of α-tocopherol to the chick diet. The addition of α-tocopherol to breeder diets having low levels of vitamin A and D oil markedly reduced the chick mortality from encephalomalacia, but did not prevent it entirely when the chicks were fed the vitamin E low ration containing added oil. The addition of α-tocopherol

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COMMERCIAL FISHERIES ABSTRACTS VOL. VIII NO. 3 PAGE 19
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. Authors' summary

4.92 ENCEPHALOMALACIA IN THE CHICK

Singsen, E. P. (University of Connecticut, Storrs)
Flour and Feed 55, No. 1, 20-21, 30 (June 1954)

The encephalomalacia research project, started in 1951, was organized to study (1) the influence of maternal nutrition on the occurrence of encephalomalacia in the chick, (2) the use of a maternal nutrition deficiency to produce chicks that would be uniformly susceptible to encephalomalacia, and (3) the production of encephalomalacia in chicks on a simplified, low-fat, low-vitamin E diet capable of supporting reasonably good growth.

When Singsen et al studied the influence of a vitamin E deficiency on the performance of breeding hens and their chicks they found:

(1) That very low levels of vitamin E intake (as reflected by low blood-tocopherol levels) did not affect egg production or adult mortality over a period of 9 months.
(2) That the vitamin E reserves of a baby chick (as measured by blood-tocopherol level) can be reduced at least three-fold by lowering the vitamin E content of the breeding ration.
(3) That vitamin E deficient chicks on a low-vitamin E ration showed good growth, low mortality, and no encephalomalacia if grown in the absence of either dietary or physiological stress factors.
(4) That the addition of 2 percent fish oil to the chick ration caused a high mortality from encephalomalacia.
(5) That chick mortality from encephalomalacia could be reduced at least half by adding vitamin E to the breeding ration.
(6) That the level of one or more of the vitamins added in a complex mixture to the breeding ration influenced the chicks' utilization of vitamin E.
(7) That a few cases of encephalomalacia were produced in newly hatched chicks.

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL. VIII NO. 3 PAGE 19
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Martin Heerdt

5.7 (Cross Reference: 4.92)

to breeders diets having low levels of vitamin A and D oil did prevent the appearance of encephalomalacia in the chicks when they were fed a normal ration containing 2 percent of added vitamin A and D oil. It was necessary to add both α-tocopherol and the complex vitamins mixture to the breeding ration in order to reduce total mortality to its lowest level.

In 13 out of 18 comparisons, chicks hatched from breeders whose diet was supplemented with α-tocopherol were heavier at the end of the experimental period than chicks hatched from breeders not receiving the supplement.

The incidence of encephalomalacia was approximately twice as high in the male as in the female chicks.

4.92

During 1952-53, large numbers of vitamin E deficient chicks were used to study the effect of vitamin E, fish oil, and several other materials, one of which was diphenyl-para-phenylenediamine (DPPD), on (1) growth, (2) blood-tocopherol level,(3) mortality, and (4) incidence of encephalomalacia.

The addition of fish oil to the ration caused a decrease in blood tocopherol and an increase in mortality and in the incidence of encephalomalacia. The first encephalomalacia deaths occurred among chicks receiving a ration containing 1 percent fish oil. Chicks that received the low-vitamin E basal ration, without fish oil, showed good growth, no encephalomalacia, and low mortality, despite a very low blood-tocopherol level. The early requirement of these chicks was less than 3 I.U. of vitamin E per pound of basal ration.

A number of substances, including the antioxidant DPPD, were tested for their anti-encephalomalacia effect. Encephalomalacia did not occur if the chicks received DPPD at levels of 0.025, 0.05, and 0.10 percent of the ration. The DPPD also protected the natural tocopherol in the basal ration. Alpha tocopherol acetate, which was more stable than vitamin E, did not derive protection from DPPD. Further experimentation showed that the protective action of DPPD for the chick occurred in the body after the feed had been consumed.

Of 12 antioxidants tested some gave no protection, some gave partial protection, and a few gave full protection. Butylated hydroxy anisole was ineffective in preventing encephalomalacia. Intramuscular injection of either a water-soluble form of vitamin E or a solution of DPPD in amounts equal to those consumed in the feed by chicks of the same age afforded complete protection against encephalomalacia.

A comparison of different fish oils as stress factors for producing encephalomalacia showed that this disease occurred in direct relation to the iodine number or unsaturation of these oils. The author concluded that the basic cause of encephalomalacia is the presence of unsaturated fatty acids from fishery products, animal products, or possibly plant products. The metabolism of these unsaturated fatty acids is normally controlled by a biological antioxidant such as vitamin E. However, with an excess of unsaturated fatty acids or a shortage of vitamin E, encephalomalacia results.

4.21

effective at all concentrations above 2.69×10^{5} molar.

The lipid-soluble antioxidants were much more effective than were the water-soluble forms in protecting linoleate from oxidation by ionizing radiation.

4.2

conjugated systems are formed. This discovery was made by means of ultraviolet spectrophotometry.

The mechanisms involved in peroxide formations in the autoxidation of fatty acid esters have been established primarily by studies conducted in the laboratories of the British Rubber Producers Association. In studies on the oxidation of ethyl linoleate at 37° C., the rate of oxidation was found to be (1) directly proportional to linoleate concentration, (2) dependent on oxygen pressure, and (3) a straight-line function of the extent of oxidation. (Since virtually all of the oxygen went initially into the formation of peroxides, the rate was also a straight line function of peroxide concentration. This suggests that the peroxides were the catalytic agents responsible for the autocatalytic character of the autoxidations.)

The autoxidation of fats may be markedly accelerated by various materials. The most effective positive catalysts or pro-oxidants are various metals and metallic salts. The salts of copper, iron, and cobalt are particularly effective at low concentrations. The acceleration of oxidation by traces of metals is important not only in relation to rancidity in food fats but also in relation to the drying of protective coatings such as paints and varnishes. The principal mechanism by which metals act as positive catalysts in autoxidation involves their catalytic effect on the decomposition of peroxides.

A biological catalyst that accelerates fat oxidation is lipoxidase, an enzyme that has been found only in plants, notably legumes. Lipoxidase accelerates the oxidation of common polyunsaturated fatty acids but not esters of saturated acids, oleate acids, or acids that contain conjugated double-bond systems. Unsaturated fatty acids and esters, including oleates, may be very rapidly oxidized by atmospheric oxygen under proper conditions in the presence of chlorophyll and light. In this case, the oxidation mechanisms are different from those of ordinary oxidation.

0.32 DENATURATION OF MYOSIN IN FISH MUSCLE AND IN MYOSIN SOL BY SALTS

Nikkila, Olavi E. and Linko, Reino R.
Suomen Kemistilehti 27B, No. 5/6, 37-42 (1954) (In English)

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0.32 RECENT WORK ON PROTEINS, WITH SPECIAL REFERENCE TO PEPTIDE BIOSYNTHESIS AND NUTRITIVE VALUE

Bender, A. E.
Journal of the Science of Food and Agriculture 5, No. 7, 305-18 (July 1954)

(Abstract of this article appears under 7.520 page 1 - January 1955 issue)

0.32 THE STEPWISE NATURE OF PROTEIN DENATURATION

Nakagawa, Shigeko; Kaminaga, Tadashi; and Araya, Shimpei
J. Biochem. (Japan) 41, 371-7 (1954)
Chemical Abstracts 48, No. 21, 12819 (1954)

0.38 ENZYMIC CLEAVAGE OF ANSERINE IN SKELETAL MUSCLE OF CODLING (GADUS CALLARIAS)

Jones, N. R.
Biochemical Journal 57, No. 3, xxiv (July 1954)

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0.38 THE PEPSIN IN THE STOMACH OF SALMON

Takaoka, Michio and Ishihara, Yoshio
J. Chem. Soc. Japan, Pure Chem. Sect. 71, 324-5 (1950)
Chemical Abstracts 45, No. 12, 5329 (1951)

0.38 RESPIRATORY ENZYMES IN THE RED MUSCLE (CHIAI) OF A FISH
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Umemura, Kiyohiko
Igaku to Seihitsugaku (Med. & Biol.) 18, 108-11 (1951)
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0.39 STUDIES ON THE MECHANISM OF NITROGEN ASSIMILATION IN MARINE ALGAE

Takagi, Mitsuzo and Murata, Kiichi
Bulletin of the Faculty of Fisheries, Hokkaido University 4, No. 4, 296-314 (February 1954) (English summary and figures)

I. On the measurement of nitrate reductase activity
II. On the nitrate reductase activity in various species of marine algae
III. On the optimum pH of the nitrate reductase in some species of marine algae

0.39 UTILIZATION OF DISSOLVED CALCIUM BY A PELECYPOD

Rao, K. Pampapathi and Goldberg, Edward D.
J. Cellular Comp Physiol. 43, 283-92 (1954)
Chemical Abstracts 48, No. 21, 13107 (1954)

"With the aid of Ca^{45} it was shown that an important source of Ca for Mytilus californiaus (I) is sea water. The mucus sheet of the gills provides an absorbing surface which is in a const. state of renewal."

0.39 VITAMIN A ACTIVITY OF FRESH OR FROZEN MUSCLE OF THE CODFISH IN THE PRESENCE OF LARD

Le Gallic, Pierre
Compt. rend. soc. biol. 144, 799-800 (1950)
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0.7 COMPOSITION OF COOKED FISH DISHES

Lee, Charles F.
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(Abstract of this article appears under 2.8 page 13 - February 1955 issue)

0.7 THE EFFECTS OF HEAT UPON THE NUTRITIVE VALUE OF PROTEIN

Rice, E. E. and Beuk, J. F.
Adv. Food Res. 4, 233-279 (1953)
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1.85 REPORT ON HANDLING OF PRAWNS

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1.85 TRANSPORTING SHRIMPS IN BRITISH COLUMBIA

Anonymous
Canadian Fisherman 41, No. 7, 22 (July 1954)

(Abstract of this article appears under 2.08 page 15- October 1954 issue)

1.86 DEVILED CRABS: 25,000 DAILY

Anonymous
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(Abstract of this article appears under 3.23 page 1)

1.86 SIZE REDUCTION -- KEY TO PROCESS INNOVATION

Kovac, George M.
Food Engineering 26, No. 12, 73-80 (December 1954)

(Abstract of this article appears under 0.12 page 13)

1.86 KEEPING QUALITY OF CHILLED DUNGENESS CRAB MEAT PACKED IN HERMETICALLY-SEALED CONTAINERS

Carlson, Clarence J.
Commercial Fisheries Review 16, No. 11, 20-21 (November 1954)

(Abstract of this article appears under 2.40 page 11)

1.87 SIZE REDUCTION -- KEY TO PROCESS INNOVATION

Kovac, George M.
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1.87 THE LOBSTER. PART II. CANNING

Dewberry, Elliot B.
Food Manufacture XXIX, No. 10, 391-395 (October 1954)

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1.87 LIVE LOBSTERS SHIPPED BY AIR IN NEW PACKAGE

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3.17 EFFICACY OF BACTERICIDAL ICE FOR FRESH STORAGE OF SEA FISH

Partmann, W.
Z. Lebensm. -Untersuch. u. -Forsch. 94, 246-64 (1952)
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3.17 MICROBIOLOGICAL DETERIORATION OF FISH POST MORTEM, ITS DETECTION AND CONTROL

Tarr, H. L. A.
Bacteriological Reviews 18, No. 1, 1-15 (March 1954)

(Abstract of this article appears under 3.12 page 13 - July 1954 issue)

3.18 DISINFECTION OF WOODEN CASES USED IN THE NORWEGIAN FISH-CANNING INDUSTRY

Spilde, Olav
Tids. Hermetikind. 36, 201-2 (1950)
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3.23 FISH HANDLING AND PROCESSING IN U.S.A. -- OYSTERS

Empey, W. A.
Fisheries Newsletter (Australia) 13, No. 3, 15-17 (March 1954)

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Sanford, F. Bruce
Fishing Gazette 71, No. 10, 40-41 (October 1954)

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3.230 TUNA A LA KING

Anonymous
Pacific Fisherman 52, No. 9, 53 (August 1954)

A new frozen food product, "Tuna a la King," was recently introduced in Los Angeles.

3.24 OZONE GENERATOR CAN RETARD ODORS AND MOLDS IN REFRIGERATED WAREHOUSES

Anonymous
Frosted Food Field XIX, No. 4, 32 (October 1954)

(Abstract of this article appears under 3.13 page 13 - January 1955 issue)

3.249 NORWEGIAN FIRM FREEZES HERRING IN ALGINATE JELLY

Anonymous
U. S. Department of the Interior, Fish and Wildlife Service, Fishery Products Report S-131, Seattle, Washington, July 8, 1954)

(Abstract of this article appears under 3.238 page 5 - October 1954 issue)

3.249 THE DETERIORATION OF FATTY ACIDS IN MEATS DURING STORAGE

Privett, Orville S.
Hormel Inst., Univ. Minnesota Ann. Report, 10-14 (1951-52)
Chemical Abstracts 48, No. 7, 4143 (1954)

3.338 CONTAMINATION OF FOOD BY METALS

Urschel, Joe
Canner 119, No. 24, 21-22, 46 (December 13, 1954)

(Abstract of this article appears under 3.18 page 17 - February 1955 issue)

3.338 SULFUR BLACKENING OF CANS FILLED WITH SHRIMP

Capuano, Giuseppe and Andreotti, Rodolfo
Industria conserve 29, 16-20 (1954)
Chemical Abstracts 48, No. 22, 14026 (1954)

"To prevent or to reduce the black spots generally occurring on the inside of tin-plated cans, it is suggested that one apply some S-resisting lacquers, or line the cans with parchment paper, or lower the pH of the brine."

3.338 LAKESEAL -- NEW ALUMINIUM ALLOY FOR FOOD CANS

Anonymous
Konserves 11, 47 (1953)
Food Science Abstracts 26, No. 3, 253 (May 1954)

"No deleterious effect on flavour could be detected in prawns packed in lacquered Lakseal cans after storage for 4 months."

7.53 REPORT ON TOTAL SOLIDS AND ETHER EXTRACT IN FISH

Risley, H. M.
Journal of the Association of Official Agricultural Chemists 37, No. 3, 602-607 (August 15, 1954)

(Abstract of this article appears under 7.43 page 7 - January 1955 issue)

7.53 DETERMINATION OF ABSOLUTE FAT IN HERRING

Brandes, C. H. and Dietrich, R.
Veroffentl. Inst. Meeresforsch. Bremerhaven 1, 232-5 (1952)
Chemical Abstracts 48, No. 21, 13120 (1954)

"Since the fat is unevenly distributed in the herring, fat can only be detd. exactly when the entire filet gills are completely worked over, which for analytical reasons is not always feasible, or when the possibility exists, to turn these without loss into an emulsionlike paste. For this purpose the 'Multimix' machine is used, at 12000 revolutions per min., producing an even distribution of fat particles, and an av. variation in fat values of only 0.2%."

7.53 RAPID DETERMINATION OF FAT IN ABSOLUTELY FRESH HERRING FLESH

Just, R. and Biegler, P.
Fischw.-u. Feinkostind. 25, 149 (1953)
Food Science Abstracts 26, No. 4, 392 (July 1954)

7.593 BIOCHEMISTRY OF FISH MUSCLE POST-MORTEM CHANGES AND EXTRACTIVES

Anonymous
Report of the Food Investigation Board (Great Britain) for the Year 1952, 39-40 (1953)

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7.593 ENZYMIC CLEAVAGE OF ANSERINE IN SKELETAL MUSCLE OF CODLING (GADUS CALLARIAS)

Jones, N. R.
Biochemical Journal 57, No. 3, xxiv (July 1954)

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7.593 THE EXTRACTION AND FRACTIONATION OF PHOSPHORUS COMPOUNDS IN ANIMAL TISSUES. I.

Niemierko, W.; Niemierko, Stella; and Wlodawer, P.
Acta Biol. Exptl. (Lodz) 16, 247-52 (1952)
Chemical Abstracts 48, No. 3, 1467 (1954)

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Journal of the Association of Official Agricultural Chemists 37, No. 4, 927-931 (November 15, 1954)

(Abstract of this article appears under 8.8 page 9)

7.82 STUDIES ON FRESHNESS DETERMINATION OF FISH MEAL BY THE DISTILLATION RATIO OF VOLATILE ACIDS. VI & VII

Asakawa, Suezo
Bulletin of the Japanese Society of Scientific Fisheries 20, No. 2, 151-170 (1954) (English summary and tables)

7.82 STUDIES ON THE METHOD OF DETERMINATION FOR FRESHNESS OF FISH-FLESH BY "DISTILLATION RATIO" OF VOLATILE ACIDS IN STEAM DISTILLATE -- III. ON THE INVESTIGATION OF THE DISTILLATING SITUATION OF VOLATILE ACIDS

Asakawa, Suezo
Bulletin of the Japanese Society of Scientific Fisheries 19, No. 4, 555-78 (August 25, 1953)
(English summary, figures and tables)

7.89 DETERMINATION OF THE AGING OF FISH BY MEANS OF IODIMETRIC TITRATION. I.

Truttwin, H.
Z. Lebensmitt.-Untersuch. u.-Forsch. 97, 275-81 (1953)
Food Science Abstracts 26, No. 4, 392 (July 1954)

"Thoroughly minced fish flesh in aqueous suspension is titrated with a 0.16% solution of iodine, in the presence of starch, until a permanent blue colour (stable for 15 minutes) is obtained; vigorous shaking during titration is important. The amount of iodine used up per g. of cod flesh was 5.1 ml. in fresh samples, and 12.6 and 18.2 ml. in samples stored for 10 and 12 days. A limiting value of 14 ml. of iodine is considered admissible."

7.89 THE ESTIMATION OF THE FRESHNESS OF MEATS AND FISHES WITH THE LASSANDRO-PEPE APPARATUS

Lassandro-Pepe, Togo and Maraglino, Guiseppe A.
Chimica (Milan) 9, 14-17 (1954)
Chemical Abstracts 48, No. 13, 7810 (July 10, 1954)

"To the juice extd. from a sample of meat or fishes, dild. with H_2O, a few drops of ammonium vanadate soln. (1% in H_2SO_4 d. = 1.60) is added and let stand 5 min. If the meat is in a good state, an emerald-green color is formed, with incipient putrefaction the color is pale green, and when putrefaction is complete, the soln. becomes white opalescent or milky. A portable app. is described."

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8.4 PROXIMATE ANALYSIS OF BRITISH COLUMBIA HERRING IN RELATION TO SEASON AND CONDITION FACTOR

Hart, John L.; Tester, Albert L.; Beall, Desmond; and Tully, John P.
Journal of the Fisheries Research Board of Canada IV, No. 5, 478-90 (February 1940)

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8.42 BIOCHEMICAL STUDIES ON THE FISH-BLOOD. IV. ON THE COLOUR OF MEAT AND FE-CONTENT IN BLOOD AND HEMOPOIETIC ORGAN

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8.50 COMPOSITION OF COOKED FISH DISHES

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8.50 STUDIES ON OYSTERS AND CLAMS: BIOCHEMICAL VARIATIONS

Venkataraman, R. and Chari, S. T.
Indian J. med. Res. 39, 533-41 (1951)
Food Science Abstracts 26, No. 5, 516 (September 1954)

"The amount of edible portion and the contents of water, protein, fat, ash, glycogen (for oysters), phosphorus, calcium, iron, and copper were estimated in oysters (Ostrea virginica) and clams (Meretrix casta), collected twice monthly (immediately after new moon and full moon) for 14 months."

8.50 COMPOSITION AND TESTING OF FISH SAUSAGES

Stoldt, W.
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